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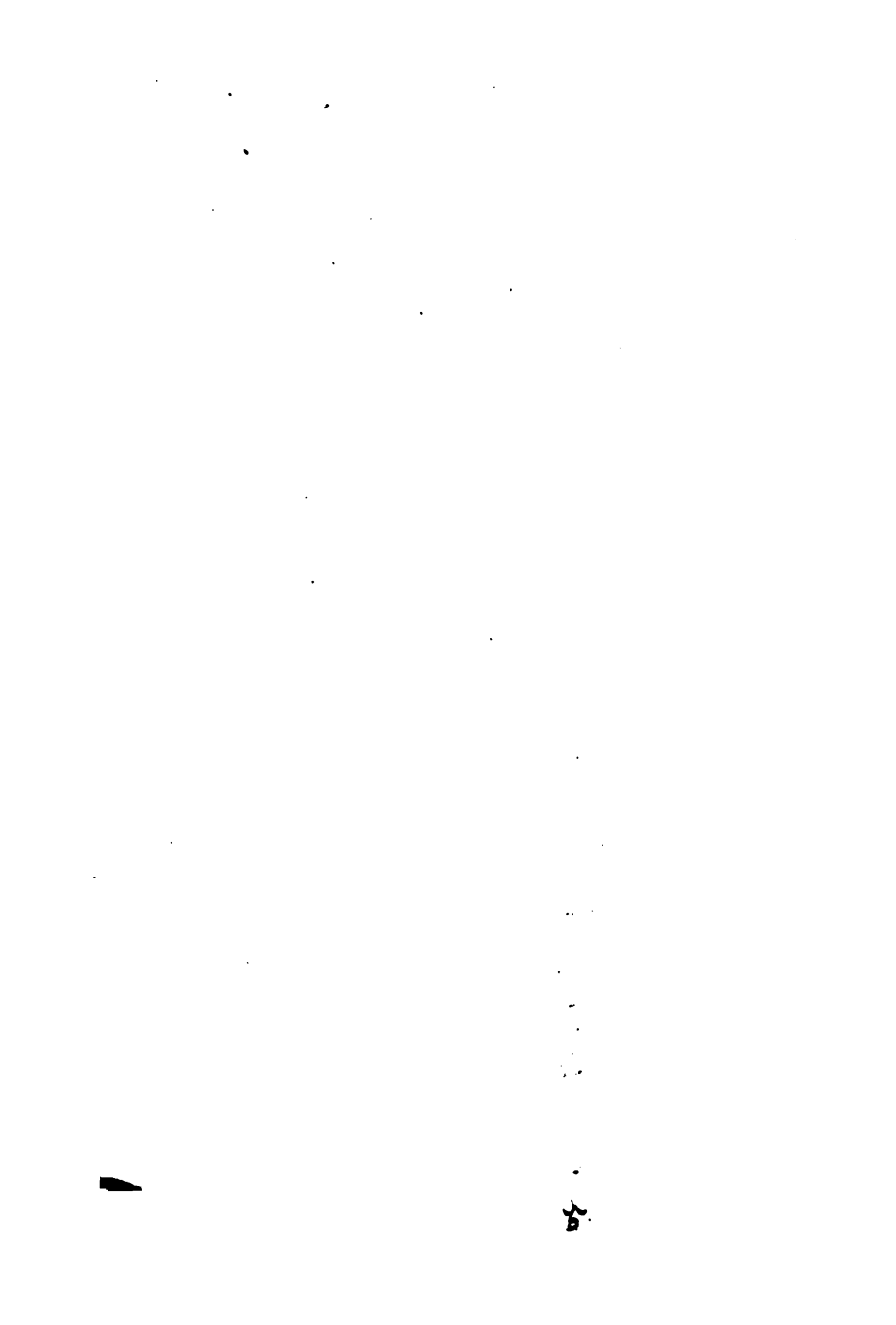
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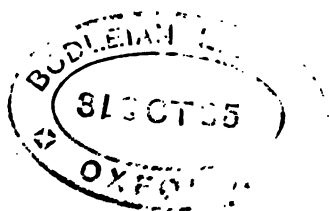
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SIXTH BOOK.

BIOGRAPHICAL SKETCH OF SHAKESPEARE.

WILLIAM SHAKESPEARE, the greatest poetical and dramatic genius of our own, or perhaps of any other country, was born at Stratford-on-Avon, in Warwickshire, in 1564, and died there in 1616.

We have few authentic details of the life of this wonderful man, and can state with certainty only the following bare facts—that he married young; went to London, where he became an actor of no great ability, and a writer of plays and poems; and that he returned to Stratford, where he lived in comfort and respectability until his death.

This is all we know of the private life of one, whose name is familiar to us as “household words,” and whose memory is dear to every Englishman, and indeed to many men of other climes and nations, who claim for the poet a world-wide citizenship.

His works are numerous and varied, and appear to include every type of human character, from the noble and virtuous, to the worthless and profane. Every circumstance, in which we can be placed, finds an appropriate expression in some page of his; and every hope and every emotion seems to have been chronicled by his masterly pen: so that he is most truly a poet of all time and all nations.

His works show a love of pure morality and deep religious feeling. Never do we find vice made to appear like virtue, or crime attractive and unpunished. In his final creations, Lear, Hamlet, Othello, &c., our feelings are warmly excited

on behalf of noble characters oppressed or deceived ; and throughout his other plays our sentiments are the same. It is true that some coarse expressions are occasionally met with in Shakespeare's pages, but these are due to the age in which he lived, and not to the disposition of the poet himself.

HENRY THE FOURTH'S ADDRESS TO SLEEP.

How many thousand of my poorest subjects
Are at this hour asleep ! Sleep ! gentle sleep !
Nature's soft nurse, how have I frightened thee,
That thou no more wilt weigh mine eyelids down,
And steep my senses in forgetfulness ?
Why rather, sleep, liest thou in smoky cribs,
Upon uneasy pallets stretching thee,
And hushed with buzzing night-flies to thy slumber,
Than in the perfumed chambers of the great,
Under the canopies of costly state,
And lulled with sounds of sweetest melody ?
O thou dull god ! why liest thou with the vile,
In loathsome beds, and leav'st the kingly couch,
A watch-case, or a common 'larum bell ?
Wilt thou upon the high and giddy mast
Seal up the ship-boy's eyes, and rock his brains
In cradle of the rude imperious surge,
And in the visitation of the winds,
Who take the ruffian billows by the top,
Curling their monstrous heads, and hanging them
With deaf'ning clamours in the slippery clouds
That, with the hurly, death itself awakes ?
Canst thou, O partial sleep ! give thy repose
To the wet sea-boy in an hour so rude ;
And, in the calmest and most stillest night,
With all appliances and means to boot,¹

Deny it to a king? Then happy low,² lie down!
Uneasy lies the head that wears a crown.

SHAKESPEARE—"King Henry IV.," Part II.

1. Boot, in addition.

2. Low, the lowly persons of humble station.

BIOGRAPHICAL SKETCH OF LORD CLARENDON.

EDWARD HYDE, Earl of Clarendon, was born at Dinton, in Wiltshire, in 1608, and died at Rouen, in France, in 1674.

He was famous as a statesman and historian.

Throughout the civil wars between Charles I. and his Parliament, he served the royal cause with zeal and devotion. After the death of Charles I., Edward Hyde shared the exile of Charles II. and upon the Restoration received many rewards and dignities, among others, the title of Earl of Clarendon; but he was afterwards disgraced and banished.

His chief literary work is a "History of the Great Rebellion," as he termed the great and successful struggle for English liberty; and from that history the following extract is taken.

THE CHARACTER AND DEATH OF LORD FALKLAND.

LUCIUS CARY, Viscount Falkland, was born in the year 1610, and was slain at the battle of Newbury, 1644.

During the civil war he embraced the king's part, but would countenance no underhand proceedings, and was deeply distressed at the sight of the evils that menaced¹ his country, the contemplation of which quite broke his spirits.

Lord Falkland possessed one of those characters of rare excellence, that win the respect and esteem of men of all ranks, ages, and political opinions. For our knowledge of this fine character we are chiefly indebted to his friend and contemporary² Lord Clarendon, who thus writes of him :—

In this unhappy battle (of Newbury) was slain the Lord Viscount Falkland, a person of such prodigious parts of learning and knowledge, of that inimitable³ sweetness and delight in conversation, of so flowing and obliging a humanity and goodness to mankind, and of that primitive simplicity and integrity of life, that if there were no other brand upon this odious and accursed civil war than that single loss, it must be most infamous and execrable⁴ to all posterity.

Before this Parliament, his condition of life was so happy, that it was hardly capable of improvement. Before he came to be twenty years of age, he was master of a noble fortune ; which descended to him through the gift of a grandfather, without passing through his father or mother, who were then both alive. His education for some years had been in Ireland, where his father was Lord-Deputy, so that when he returned into England, to the possession of his fortune, he was unentangled with any acquaintance or friends, which usually grow up by the custom of conversation, and therefore was free to make a pure election of his company, which he chose by other rules than were prescribed to the young nobility of that time. And it cannot be denied, though he admitted some few to his friendship for the agreeableness of their natures, and their undoubted affection for him, that his familiarity and friendship, for the most part, was with men of eminent and sublime parts, and of *untouched* reputation in point of integrity.

He had a courage of the most clear and keen temper, and so far from fear, that he seemed not without some appetite of danger ; and therefore, upon any occasion of action, he always engaged his person in those troops which he thought, by the forwardness of the commanders, to be most like to be farthest engaged : and in all such encounters, he had about him an extraordinary cheerfulness, without at all affecting the execution that usually attended them, in which he took no delight, but took pains to prevent it, where it was not by resistance made necessary ; insomuch that at Edgehill, when the enemy was routed, he was like to have incurred great peril by interposing to save those who had thrown away their arms, and against whom, it may be, others were more fierce for their having thrown them away ; so that a man might think he came into the field chiefly out of curiosity to see the face of danger, and charity to prevent the shedding of blood.

From the entrance into this unnatural war, his natural cheerfulness and vivacity grew clouded, and a kind of sadness and dejection of spirit stole upon him which he had never been used to ; yet, being one of those who believed, that one battle would end all differences, and that there would be so great a victory on the one side that the other would be compelled to submit to any conditions from the victor (which supposition and conclusion generally sank into the minds of most men, and prevented the looking after many advantages, that might then have been laid hold of), he resisted those indispositions.⁵ But after the furious resolution of the two Houses not to admit any treaty for peace, those indispositions, which had before touched him, grew into a perfect habit of uncheerfulness, and he, who had been so exactly easy and affable to all men, that his face and countenance was always present and vacant to his com-

pany, and held any cloudiness or less pleasantness of the visage a kind of rudeness or incivility, became, on a sudden, less communicable, and thence very sad, pale, and exceedingly affected with the spleen.⁶ In his clothes and habit, which he had minded before with more neatness, and industry, and expense, than is usual to so great a soul, he was now not only incurious, but too negligent; and in his reception of suitors, and the necessary or casual addresses to his place, so quick, and sharp, and severe, that there wanted not some men (strangers to his nature and disposition) who believed him proud and imperious—faults from which no mortal man was ever more free.

When there was any overture or hope of peace, he would be more erect and vigorous, and exceedingly solicitous to press anything, which he thought might promote it; and, sitting among his friends, would with a shrill and sad accent utter the word, *Peace, peace*; and would passionately profess, "that the very agony of the war, and the view of the calamities and desolation the kingdom did and must endure, took his sleep from him, and would shortly break his heart." This made some think, or pretend to think, "that he was so much enamoured of peace, that he would have been glad the King should have bought it at any price," which was a most unreasonable calumny.⁷ As if a man that was himself most punctual and precise in every circumstance that might reflect upon conscience or honour, could have wished the King to have committed a trespass against either. And yet this senseless scandal made some impression upon him, or at least he used it for an excuse of the daringness of his spirit; for at the siege before Gloucester, when his friend passionately reprehended⁸ him for exposing his person unnecessarily to danger

(for he delighted to visit the trenches and nearest approaches, and discover what the enemy did), as being so much beside the duty of his place,⁹ that it might be understood rather to be against it, he would say merrily, "that his office could not take away the privilege of his age, and that a secretary in war might be present at the greatest secret in danger," but withal alleged seriously, that it concerned him more to be active in enterprises of hazard than most men, that all might see that his impatience for peace proceeded not from pusillanimity¹⁰ or fear to adventure his own person.

In the morning before the battle, as always upon action, he was very cheerful, and put himself in the front rank of the Lord Byron's regiment, then advancing upon the enemy, who had lined the hedges on both sides with musketeers; from whence he was shot with a musket in the lower part of the body, and in the instant, falling from his horse; his corpse was not found till the next morning, till when there was some hope that he might have been a prisoner, though his nearest friends, who knew his temper, received small comfort from that imagination. Thus fell that incomparable¹¹ young man, in the four-and-thirtieth year of his age, having so much dispatched the true business of life, that the eldest rarely attain to that immense knowledge, and the youngest enter not into the world with more innocency. Whosoever leads such a life needs be the less anxious upon how short a warning it is taken from him.

"The Great Rebellion," by LORD CLARENDON.

1. **MENACED**, threatened.

2. **CONTEMPORARY**, one who lives at the same time with another. (Lat. *con*, together; *tempus*, time.)

3. **INIMITABLE**, surpassingly excellent; that which cannot be imitated.

4. **EXEORABLE**, accursed; lit., *excluded from what is sacred*. (Lat. *ex*, from; *sacer*, sacred.)

5. **INDISPOSITIONS**, the word here signifies not illness of body, but sadness and depression of mind.

6. **THE SPLEEN**, a state of melancholy and depression.

7. **CALUMNY**, slander ; false accusation maliciously made.

8. **REPREHENDED**, blamed, reprov'd.

9. **HIS PLACE**, the place here referred to, is Falkland's office of Secretary of War.

10. **PUSILLANIMITY**, cowardice ; lit., *having little mind*. (Lat. *pusillus*, very little ; *animus*, mind or spirit.)

11. **INCOMPARABLE**, matchless ; that which so far exceeds others that it cannot be compared with them.

DEATH-BED OF HENRY IV.

[**PRINCE HENRY**, thinking his father dead, has taken the crown from his pillow, and placed it on his own head. The King awakes and calls him.]

P. Henry. I never thought to hear you speak again.

K. Henry IV. Thy wish was father, Harry, to that thought :

I stay too long by thee, I weary thee.

Dost thou so hunger for my empty chair,

That thou wilt needs invest thee with mine honours

Before thy hour be ripe ? O foolish youth !

Thou seek'st the greatness that will overwhelm thee.

Stay but a little ; for my cloud of dignity

Is held from falling with so weak a wind,

That it will quickly drop : my day is dim.

Thou hast stol'n that, which, after some few hours,

Were thine without offence ; and at my death

Thou hast sealed up my expectation :

Thy life did manifest thou lov'dst me not,

And thou wilt have me die assured of it.

Thou hid'st a thousand daggers in thy thoughts,

Which thou hast whetted¹ on thy stony heart,
To stab at half an hour of my life.
What ! canst thou not forbear me half an hour ?
Then get thee gone, and dig my grave thyself ;
And bid the merry bells ring to thine ear,
That thou art crownèd, not that I am dead.
Let all the tears that should bedew my hearse,
Be drops of balm to sanctify thy head :
Only compound² me with forgotten dust ;
Give that, which gave thee life, unto the worms
Pluck down my officers, break my decrees ;
For now a time is come to mock at form :—
Harry the Fifth is crown'd !—Up, vanity !
Down, royal state ! all you sage counsellors, hence !
And to the English court assemble now,
From every region, apes of idleness !
Now, neighbour confines,³ purge you of your scum :
Have you a ruffian that will swear, drink, dance,
Revel the night, rob, murder, and commit
The oldest sins the newest kind of ways ?
Be happy, he will trouble you no more ;
England shall double gild his treble guilt,—
England shall give him office, honour, might ;
For the fifth Harry from curbed licence plucks
The muzzle of restraint, and the wild dog
Shall flesh his tooth in every innocent.
O my poor kingdom, sick with civil blows !
When that my care could not withhold thy riots,
What wilt thou do when riot is thy care ?
O, thou wilt be a wilderness again,
Peopled with wolves, thy old inhabitants !
P. Hen. [Kneeling.] O, pardon me, my liege ! but for
my tears,
The moist impediments unto my speech,

I had forstall'd this dear and deep rebuke,
Ere you with grief had spoke, and I had heard
The course of it so far. There is your crown;
And He that wears the crown immortally,
Long guard it yours! If I affect it more,
Than as your honour, and as your renown,
Let me no more from this obedience rise,—
Which my most true and inward duteous spirit
Teacheth,—this prostrate and exterior bending!
Heaven witness with me, when I here came in,
And found no course of breath within your majesty,
How cold it struck my heart! if I do feign,
O, let me in my present wildness die,
And never live to show th' incredulous world
The noble change that I have purposed!
Coming to look on you, thinking you dead,
(And dead almost, my liege, to think you were,)
I spake unto the crown, as having sense,
And thus upbraided it: "*The care on thee depending,
Hath fed upon the body of my father;
Therefore thou, best of gold, art worst of gold:
Other, less fine in carat,⁴ is more precious,
Preserving life in medicine potable;
But thou, most fine, most honoured, most renowned,
Hast eat thy bearer up.*" Thus, my most royal liege,
Accusing it, I put it on my head,
To try with it,—as with an enemy
That had before my face murdered my father,—
The quarrel of a true inheritor.
But if it did infect my blood with joy,
Or swell my thoughts to any strain of pride;
If any rebel or vain spirit of mine
Did, with the least affection of a welcome,
Give entertainment to the might of it,—

Let God for ever keep it from my head,
And make me as the poorest vassal is,
That doth with awe and terror kneel to it !

K. Hen. O my son,
Heaven put it in thy mind to take it hence,
That thou mightst win the more thy father's love,
Pleading so wisely in excuse of it !
Come hither, Harry, sit thou by my bed ;
And hear, I think, the very latest counsel
That ever I shall breathe. Heaven knows, my son,
By what bypaths, and indirect crooked ways,
I met this crown ; and I myself know well
How troublesome it sat upon my head :
To thee it shall descend with better quiet,
Better opinion, better confirmation ;
For all the soil of the achievement goes
With me into the earth. It seemed in me,
But as an honour snatched with boist'rous hand ;
And I had many living to upbraid
My gain of it by their assistances ;
Which daily grew to quarrel, and to bloodshed,
Wounding supposed peace ; all these bold fears,
Thou seest, with peril I have answerèd ;
For all my reign hath been but as a scene
Acting that argument : and now my death
Changes the mode ; for what in me was purchased,
Falls upon thee in a more fairer sort ;
So thou the garland wear'st successively.⁵
Yet, though thou stand'st more sure than I could do,
Thou art not firm enough, since griefs are green ;
And all my friends,—which thou must make thy
friends,—
Have but their stings and teeth newly ta'en out ;
By whose fell working I was first advanced,

And by whose power I well might lodge a fear
 To be again displaced : which to avoid,
 I cut them off ; and had a purpose now
 To lead out many to the Holy Land,
 Lest rest, and lying still, might make them look
 Too near unto my state. Therefore, my Harry,
 Be it thy course to busy giddy minds
 With foreign quarrels ; that action, hence borne out,
 May waste the memory of the former days.
 More would I, but my lungs are wasted so,
 That strength of speech is utterly denied me.
 How I came by the crown, O God, forgive !
 And grant it may with thee in true peace live !
P. Hen. My gracious liege,
 You won it, wore it, kept it, gave it me ;
 Then plain and right must my possession be :
 Which I, with more than with a common pain,
 'Gainst all the world will rightfully maintain.

SHAKESPEARE—" *King Henry IV.*"

1. WHETTED, made keen ; sharpened by rubbing.
 2. COMPOUND, mingle. (Lat, *pono*, to place.)
 3. CONFINES, borders, boundaries ; thus *neighbour confines* signify adjacent or neighbouring countries. (Lat, *finis*, the end.)
 4. CARAT, a weight of four grains troy, used in weighing gold and precious stones. The quantity of pure metal mixed with alloy is generally stated as so many carats out of twenty-four. So that "less fine of carat" would signify gold less pure, and containing more alloy.
 5. SUCCESSIVELY, in succession after his father, thus gaining a better title.
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ON CONVERSATION :

A LETTER OF SIR MATTHEW HALE TO HIS CHILDREN,
WRITTEN ABOUT 1662.

[SIR MATTHEW HALE was born at Alderley, in the county of Gloucester, in 1609, and died in 1676. He was made Lord-Chief-Justice of the Court of King's Bench in the reign of Charles II., and enjoyed the high reputation of being one of the most able and upright judges that ever sat upon the seat of justice.]

DEAR CHILDREN,—I thank God, I came well to Farrington this day about five o'clock. And, as I have some leisure time at my inn, I cannot spend it more to my own satisfaction, and your benefit, than by a letter to give you some good counsel. The subject shall be concerning your speech, because much of the good or evil that befalls persons arises from the well or ill managing of their conversation. When I have leisure and opportunity, I shall give you my directions on other subjects.

Never speak anything for a truth, which you know or believe to be false. Lying is a great sin against God, who gave us a tongue to speak truth, and not falsehood. It is a great offence against humanity itself. For where there is no regard to truth, there can be no safe society between man and man. And it is an injury to the speaker ; for besides the disgrace which it brings upon him, it occasions so much baseness of mind, that he can scarcely tell truth, or avoid lying, even when he has no colour of necessity for it ; and in time, he comes to such a pass, that as other people cannot believe he speaks truth, so he himself scarcely knows, when he tells a falsehood. As you must be careful not to lie, so you must avoid coming near it. You must not equivocate,¹

nor speak anything positively, for which you have no authority but report, or conjecture, or opinion.

Let your words be few, especially when your superiors or strangers are present, lest you betray your own weakness, and rob yourselves of the opportunity, which you might otherwise have had, to gain knowledge, wisdom, and experience, by hearing those whom you silence by your impertinent talking.

Be not too earnest, loud, or violent in your conversation. Silence your opponent with reason, not with noise.

Be careful not to interrupt another, when he is speaking; hear him out, and you will understand him the better, and you will be able to give him the better answer.

Consider before you speak, especially when the business is of moment; weigh the sense of what you mean to utter, and the expressions you intend to use, that they be significant, pertinent,² and inoffensive. Inconsiderate persons do not think, till they speak; or they speak, and then think.

Some men excel in husbandry, some in gardening, some in mathematics. In conversation learn, as near as you can, where the skill or excellence of any person lies. Put him upon talking on that subject; observe what he says; keep it in your memory, or commit it to writing. By this means you will glean the worth and knowledge of everybody you converse with, and, at an easy rate, acquire what may be of use to you on many occasions.

When you are in company with light, vain, impertinent persons, let the observing of their failings make you the more cautious, both in your conversation with them and your general behaviour, that you may avoid their errors.

If any one, whom you do not know to be a person of

truth, sobriety, and weight, relates strange stories, be not too ready to believe or report them ; and yet (unless he is one of your intimate acquaintances) be not too forward to contradict him. If the occasion requires you to declare your opinion, do it modestly and gently, not bluntly nor coarsely ; by this means you will avoid giving offence, or being abused for too much credulity.

If a man, whose integrity you do not very well know, makes you great and extraordinary professions, do not give too much credit to him. Probably you will find, that he aims at something besides kindness to you, and that when he has served his turn, or been disappointed, his regard for you will grow cool. Beware also of him, who flatters you, and commends you to your face, or to one he thinks will tell you of it. Most probably he has either deceived and abused you, or means to do so. Remember the fable of the fox commending the singing of the crow, who had something in her mouth, which the fox wanted.

Be careful, that you do not commend yourselves. It is a sign, that your reputation is small and sinking, if your own tongue must praise you ; and it is fulsome^s and displeasing to others to hear such commendations.

Speak well of the absent, whenever you have a suitable opportunity. Never speak ill of them, or of anybody, unless you are sure they deserve it, and unless it is necessary for their amendment, or for the safety and benefit of others.

Avoid, in your ordinary communications, not only oaths, but all imprecations and earnest protestations.

Forbear scoffing and jesting at the condition or natural defects of any person. Such offences leave a deep impression, and they often cost a man dear.

Be very careful that you give no reproachful, menacing,

or spiteful words to any person. Good words make friends, bad words make enemies. It is great prudence to gain as many friends, as we honestly can, especially when it may be done at so easy a rate as a good word; and it is great folly to make an enemy by ill words, which are of no advantage to the party who uses them. When faults are committed, they may, and by a superior they must, be reprov'd; but let it be done without reproach or bitterness, otherwise it will lose its due end, and, instead of reforming the offence, it will exasperate the offender, and lay the reprover justly open to reproof.

If a person be passionate, and give you ill language, rather pity him than be moved to anger. You will find that silence, or very gentle words, are the most exquisite revenge for reproaches; they will either cure the distemper⁴ in the angry man, and make him sorry for his passion, or they will be a severe reproof and punishment to him. But, at any rate, they will preserve your innocence, give you the deserved reputation of wisdom and moderation, and keep up the serenity and composure of your mind. Passion and anger make a man unfit for everything that becomes him as a man or as a Christian.

Never utter any profane speeches, nor make a jest of any Scripture expressions. When you pronounce the name of God or of Christ, or repeat any passages of words of Holy Scripture, do it with reverence and seriousness, and not lightly, for that is "taking the name of God in vain."

If you hear of any unseemly expressions used in religious exercises, do not publish them; endeavour to forget them, or, if you mention them at all, be it with pity and sorrow, not with derision or reproach.

Read these directions often, think of them seriously,

and practise them diligently. You will find them useful in your conversation, which will be every day the more evident to you, as your judgment, understanding, and experience increase.

I have little further to add at this time, but my wish and command, that you will remember the former counsels, that I have frequently given you. Begin and end the day with private prayer; read the Scriptures often and seriously; be attentive to the public worship of God. Keep yourselves in some useful employment; for idleness is the nursery of vain and sinful thoughts, which corrupt the mind and disorder the life. Be kind and loving to one another. Honour your minister. Be not bitter nor harsh to my servants. Be respectful to all. Bear my absence patiently and cheerfully. Behave as if I were present among you and saw you. Remember you have a greater Father than I am, who always, and in all places, beholds you, and knows your hearts and thoughts. Study to requite⁵ my love and care for you with dutifulness, observance, and obedience; and account it an honour that you have an opportunity, by your attention, faithfulness, and industry, to pay some part of that debt which, by the laws of nature and of gratitude, you owe to me. Be frugal in my family, but let there be no want; and provide conveniently for the poor.

I pray God to fill your hearts with His grace, fear, and love, and to let you see the comfort and advantage of serving Him; and that His blessing, and presence, and direction may be with you, and over you, all.—I am,

YOUR EVER-LOVING FATHER.

1. EQUIVOCATE, to use words of double or doubtful meaning in order to mislead. (Lat. *æquus*, equal; *vox*, a voice or sound.)

2. PERTINENT, fitting, appropriate.

3. **FULSOME**, offensive.

4. **DISTEMPER**, indisposition ; unhealthy state of body or mind. The use of this word is now generally confined to the name of a disease, to which dogs are especially subject.

5. **REQUIRE**, to pay in return, to give back.

SIR MATTHEW HALE'S GOLDEN MAXIM.

A Sunday well spent
Brings a week of content,
And health for the toils of the morrow;
But a Sabbath profaned,
Whatsoe'er may be gained,
Is a certain forerunner of sorrow.

BIOGRAPHICAL SKETCH OF SPENSER.

EDMUND SPENSER, one of the earliest and most distinguished of our English poets, was born in 1553, and died in 1598.

His first poem, "The Shepherd's Calendar," gained for him the notice of the celebrated Sir Philip Sydney,¹ who obtained for him an office under Government, and afterwards the grant of a large estate in Ireland. During Spenser's residence in the latter country, he employed his leisure in writing his celebrated poem of the "Faery Queen," an allegorical² composition, dedicated to Queen Elizabeth, and representing herself and the chief persons in her court. Of this famous work we only possess the six opening books, the six remaining books having been lost, either in the poet's flight from Ireland, or in the sad circumstances which preceded it, when Spenser's house was pillaged and burned, his youngest child perishing in the flames.

The poet did not long survive this calamity, but died of grief in a few months. We know little of his private charac-

ter, but his works are as conspicuous for their pure morality and devotional spirit, as for their beauty of imagery, pathos, and melodious versification.

The following extract from one of his shorter poems will give an idea of the style of this justly famous poet.

HYMN OF HEAVENLY BEAUTY.

FAR above these heavens, which here we see,
Are others, far exceeding these in light,
Not bounded, not corrupt, as these same be,
But infinite in largeness and in height,
Unmoving, uncorrupt, and spotless bright,
That need no sun to illuminate their spheres,
But their own native light, far passing theirs.

And, as these heavens still by degrees arise,
Until they come to their first Mover's bound,
That in His mighty compass doth comprise,
And carry all the rest with Him around ;
So those likewise do by degrees redound
And rise more fair, till they at last arrive
To the most fair, whereto they all do strive.

Fair is the heaven, where happy souls have place
In full enjoyment of felicity,
Whence they do still behold the glorious face
Of the Divine Eternal Majesty :
More fair is that, where those ideas ³ on high
Enranged be, which Plato ⁴ so admired,
And pure intelligences from God inspired.

Yet fairer is that heaven, in which do reign
The sovereign powers and mighty potentates,
Which in their high protections do contain
All mortal princes and imperial states :

And fairer yet, whereas ⁵ the royal seats
And heavenly dominations ⁶ are set,
From whom all earthly governance is fet.⁷

Yet far more fair be those bright cherubim,
Which all with golden wings are overdight,⁸
And those eternal burning seraphim,
Which from their faces dart out fiery light :
Yet fairer than they both, and much more bright,
Be th' angels and archangels, which attend
On God's own person without rest or end.

These thus in fair each other far excelling,
As to the Highest they approach more near,
Yet is that brightness, far beyond all telling,
Fairer than all the rest, which there appear,
Though all their beauties joined together were ;
How then can mortal tongue hope to express
The image of such endless perfectness ?

Cease then, my tongue ! and lend unto my mind
Leave to bethink how great that beauty is,
Whose utmost parts so beautiful I find ;
How much more these essential ⁹ parts of His,
His truth, His love, His wisdom, and His bliss,
His grace, His doom, His mercy, and His might,
By which He lends us of Himself a sight !

Those unto all He daily does display,
And show Himself in th' image of His grace,
As in a looking-glass, through which He may
Be seen of all His creatures, vile and base,
That are unable else to see His face,—
His glorious face, which glistereth else so bright,
That th' angels' selves cannot endure His sight.

SPENSER.

1. SIR PHILIP SIDNEY, an English statesman and author, the favourite of Queen Elizabeth, and one whom she justly called "the jewel of her time," for among the famous men, who then flourished, his character and conduct have been ever most justly esteemed. He was born 1554, and died at the battle of Zutphen, in Holland, 1586.

2. ALLEGORICAL, figurative ; a description of one thing under the figure of another.

3. IDEES, the old form for ideas.

4. PLATO, a celebrated Greek philosopher, born 429 B.C., died 348 B.C. Plato was esteemed the wisest man of his time. Besides God and matter, his philosophy treats of eternal types or models, according to which all creatures have been formed; these he calls *ideas*. The *ideas* only have real and absolute existence; individual things are but shadows or copies of them. The *ideas* reside in God, who is their common substance. It is this part of Plato's philosophy, to which Spenser refers in the poem.

5. WHEREAS, where.

6. DOMINATIONS, governments. (Lat. *dominus*, a master.)

7. FET, an obsolete form of *fetched*; brought, obtained.

8. OVERDIGHT, adorned, arrayed.

9. ESSENTIAL, important in the highest degree; relating to, or containing the essence of, being.

BIOGRAPHICAL SKETCH OF ADDISON.

JOSEPH ADDISON was born at Milston, in Wiltshire, in the year 1672, and died in 1719.

He was one of the most celebrated English writers of his day, and well deserved his fame : he wrote poems and plays, but chiefly prose essays. The most admirable of these latter were contributed by him to the *Spectator* and *Tatler*, periodicals chiefly started by himself, and of which he was part editor.

Addison held several public offices, and was an ardent politician ; but in 1717 he received a pension from Government, and spent the following years in privacy.

Addison had a great reputation for taste and elegance ; his style is clear, simple, and graceful, and at the same time forcible, as will be seen from the following and other extracts.

THE COMMERCE OF ENGLAND IN THE REIGN OF QUEEN ANNE.

THERE is no place in the town, that I so much love to frequent as the Royal Exchange. It gives me a secret satisfaction, and in some measure gratifies my vanity, as I am an Englishman, to see so rich an assembly of countrymen and foreigners consulting together upon the private business of mankind, and making this metropolis a kind of emporium¹ of the whole earth. I must confess, I look upon High 'Change to be a great council, in which all considerable nations have their representatives. Factors² in the trading world are what ambassadors are in the political world; they negotiate affairs, conclude treaties, and maintain a good correspondence between those wealthy societies of men, that are divided from one another by seas and oceans, or live on the different extremities of a continent. I have often been pleased to hear disputes adjusted between an inhabitant of Japan and an alderman of London, or to see a subject of the Great Mogul entering into a league with one of the Czar of Muscovy. I am infinitely delighted in mixing with these ministers of Commerce, as they are distinguished by their different walks and different languages. Sometimes I am jostled among a body of Armenians; sometimes I am lost in a crowd of Jews; and sometimes make one in a group of Dutchmen. I am a Dane, Swede, or Frenchman at different times; or rather fancy myself like the old philosopher, who, upon being asked what countryman he was, replied that he was a citizen of the world.

This grand scene of business gives me an infinite variety of solid and substantial entertainments. As I

am a great lover of mankind, my heart naturally overflows with pleasure at the sight of a prosperous and happy multitude, insomuch that at many public solemnities I cannot forbear expressing my joy with tears, that have stolen down my cheeks. For this reason I am wonderfully delighted to see such a body of men thriving in their own private fortunes, and at the same time promoting the public stock; or in other words, raising estates for their own families by bringing into their country whatever is wanting, and carrying out of it whatever is superfluous.

Nature seems to have taken a particular care to disseminate³ her blessings among the different regions of the world, with an eye to this mutual intercourse and traffic among mankind, that the natives of the several parts of the globe might have a kind of dependence upon one another, and be united together by their common interest. Almost every degree produces something peculiar to it; the food often grows in one country, and the sauce in another. The fruits of Portugal are corrected by the products of Barbadoes. The infusion of a China plant sweetened with the pith of an Indian cane. The Philippine Islands give a flavour to our European bowls. The single dress of a woman of quality is often the product of a hundred climes. The muff and the fan come together from the different ends of the world. The scarf is sent from the torrid zone, and the tippet from beneath the pole. The brocade petticoat rises out of the mines of Peru, and the diamond necklace out of the mines of Hindostan.

If we consider our own country in its natural aspect, without any of the benefits and advantages of commerce, what a barren uncomfortable spot of earth falls to our share! Natural historians tell us, that no fruit grew

originally among us besides hips and haws, acorns and pig-nuts, with other delicacies of a like nature ; that our climate of itself, without the assistance of art, can make no further advances towards a plum than to a sloe, and carries an apple to no greater perfection than a crab ; that our melons, our peaches, our figs, our apricots, our cherries, are strangers among us, imported in different ages, and naturalised in our English gardens ; and that they would all degenerate,⁴ and fall away into the trash of our own country, if they were wholly neglected by the planter, and left to the mercy of our sun and soil. Nor has traffic more enriched our vegetable world, than it has improved the whole face of nature among us. Our ships are laden with the harvest of every climate. Our tables are stored with spices, and oils, and wines. Our rooms are filled with pyramids of China, and adorned with the workmanship of Japan. Our morning's draught comes to us from the remotest corners of the earth. We repair our bodies by the drugs of America, and repose ourselves under Indian canopies. My friend, Sir Andrew, calls the vineyards of France our gardens, the Spice Islands our hotbeds, the Persians our silk-weavers, and the Chinese our potters. Nature indeed furnishes us with the bare necessities of life, but traffic gives us greater variety of what is useful, and at the same time supplies us with everything that is convenient and ornamental. Nor is it the least part of this our happiness, that whilst we enjoy the remotest products of the North and South, we are free from those extremities of weather, which gave them birth ; that our eyes are refreshed with the green fields of Britain, at the same time that our palates are feasted with fruits, that rise between the tropics.

For these reasons, there are no more useful members

in a commonwealth than merchants. They knit mankind together in a mutual intercourse of good offices, distribute the great gifts of nature, find work for the poor, add wealth to the rich, and magnificence to the great. Our English merchant converts the tin of his own country into gold, and exchanges his wool for rubies. The Mohammedans are clothed in our British manufacture, and the inhabitants of the frozen zone warmed with the fleeces of our sheep.

When I have been upon the 'Change, I have often fancied one of our old kings standing in person, where he is represented in effigy,⁵ and looking down upon the wealthy concourse of people, with which that place is every day filled. In this case, how would he be surprised to hear all the languages of Europe spoken in this little spot of his former dominions, and to see so many private men, who in his time would have been the vassals of some powerful baron, negotiating like princes for greater sums of money than were formerly met with in the royal treasury! Trade, without enlarging the British territories, has given us a kind of additional empire; it has multiplied the number of the rich, made our landed estates infinitely more valuable than they were formerly, and added to them an accession of other estates as valuable as the lands themselves.

ADDISON.

1. EMPORIUM, a mart, a place of extensive trade or commerce.
2. FACTOR, a doer, or transactor of business for another; a mercantile agent, who transacts business for another. (Lat. *facio*, to do, to make, &c.)
3. DISSEMINATE, to sow, scatter, or spread far and wide. (Lat. *semino*, to sow.)
4. DEGENERATE, to grow worse; to fall from one's genus or race. (Lat. *genus*, race.)
5. EFFIGY, an image, figure, or likeness of a person or thing. (Lat. *effingo*, to fashion.)

HENRY V. BEFORE THE BATTLE OF
AGINCOURT.

Westmoreland. O that we now had here
But one ten thousand of those men in England,
That do no work to-day !

King Henry V. What's he that wishes so ?
My cousin Westmoreland !—No, my fair cousin :
If we are marked to die, we are enow
To do our country loss ; and if to live,
The fewer men, the greater share of honour.
God's will ! I pray thee, wish not one man more.
By Jove, I am not covetous for gold ;
Nor care I who doth feed upon my cost ;¹
It yearns² me not, if men my garments wear ;
Such outward things dwell not in my desires :
But, if it be a sin to covet honour,
I am the most offending soul alive.
No, 'faith my coz,³ wish not a man from England :
God's peace ! I would not lose so great an honour,
As one man more, methinks, would share from me,
For the best hope I have. O, do not wish one more !
Rather proclaim it, Westmoreland, through my host,
That he, which hath no stomach to this fight,
Let him depart ; his passport shall be made,
And crowns for convoy⁴ put into his purse :
We would not die in that man's company,
That fears his fellowship to die with us.
This day is called—the feast of Crispian :⁵
He that outlives this day, and comes safe home,
Will stand a-tiptoe, when this day is named,
And rouse him at the name of Crispian.
He that shall live this day, and see old age,

Will yearly on the vigil ⁶ feast his neighbours,
And say—To-morrow is Saint Crispian :
Then will he strip his sleeve, and show his scars,
And say—These wounds I had on Crispin's day.
Old men forget ; yet all shall be forgot,
But he'll remember with advantages
What feats he did that day. Then shall our names,
Familiar in their mouths as household words,—
Harry the King, Bedford and Exeter,
Warwick and Talbot, Salisbury and Glo'ster,—
Be in their flowing cups freshly remembered.
This story shall the good man teach his son ;
And Crispin Crispian shall ne'er go by,
From this day to the ending of the world,
But we in it shall be remembered,—
We few, we happy few, we band of brothers ;
For he, to-day, that sheds his blood with me,
Shall be my brother ; be he ne'er so vile,
This day shall gentle ⁷ his condition :
And gentlemen in England, now a-bed,
Shall think themselves accursed they were not here ;
And hold their manhoods cheap, while any speaks
That fought with us upon Saint Crispin's day.

THE KING'S PRAYER.

King Henry V. O God of battles ! steel my soldiers'
hearts ;
Possess them not with fear ; take from them now
The sense of reckoning, if th' opposèd numbers
Pluck their hearts from them !—Not to-day, O Lord,
O not to-day, think not upon the fault
My father made in compassing the crown !
I Richard's ⁸ body have interrèd new ;

And on it have bestowed more contrite tears,
 Than from it issued forced drops of blood :
 Five hundred poor I have in yearly pay,
 Who twice a day their withered hands hold up
 Toward heaven, to pardon blood ; and I have built
 Two chantries,⁹ where the sad and solemn priests
 Sing still for Richard's soul. More will I do ;
 Though all that I can do is nothing worth,
 Since that my penitence comes after all,
 Imploring pardon.

SHAKESPEARE—"Henry V."

1. FEED UPON MY COST, feed at my cost or expense.
2. YEARNs, grieves, vexes.
3. COZ, contraction of *cousin*.
4. CONVOY, conveyance ; to pay for his conveyance or passage.
5. CRISPIAN, one of the numerous saints of the Roman Catholic calendar. The day dedicated to him is 25th October ; the battle of Agincourt was fought on that day in 1415.
6. VIGIL, the eve before a feast or fast-day. (Lat. *vigil*, awake, watchful.)
7. GENTLE HIS CONDITION, make his state or condition that of a gentleman.
8. RICHARD, the reference here is to Richard II., deposed, and probably murdered, by the command of Henry IV.
9. CHANTRIES, endowed chapels, where masses were chanted by one or more priests for the souls of the persons in whose memory the chantry had been erected.

THE USE OF FABLES.

THERE is nothing which we receive with so much reluctance as advice. We look upon a man who gives it us, as offering an affront to our understanding, and treating us like children or idiots. We consider the instruction as implied censure, and the zeal, which any one shows for our good on such an occasion, as a piece

of presumption or impertinence. The truth of it is, the person who pretends to advise, does, in that particular, exercise a superiority over us, and can have no other reason for it, but that in comparing us with himself, he thinks us defective either in our conduct or our understanding. For these reasons there is nothing so difficult as the art of making advice agreeable; and indeed all writers, both ancient and modern, have distinguished themselves among one another according to the perfection, at which they have arrived in this art. How many devices have been made use of to render this bitter potion¹ palatable!² Some convey their instruction to us in the best-chosen words; others in the most harmonious numbers;³ some in points of wit; and others in short proverbs.

But among all the different ways of giving counsel, I think the finest, and that which pleases the most universally, is the fable, in whatsoever shape it appears. If we consider this way of instructing or giving advice, it excels all others, because it is the least shocking, and the least subject to those exceptions, which I have before mentioned.

This will appear to us, if we reflect in the first place, that, upon the reading of a fable, we are made to believe that we advise ourselves. We peruse the author for the sake of the story, and consider the precepts rather as our own conclusions than his instructions. The moral insinuates⁴ itself imperceptibly; we are taught by surprise, and become wiser and better unawares. In short, by this method a man is so far overreached as to think that he is directing himself, whilst he is following the dictates of another, and consequently is not sensible of that, which is the most displeasing circumstance in advice.

In the next place, if we look into human nature, we shall find, that the mind is never so much pleased as when she exerts herself in any action, that gives her an idea of her own perfections and abilities. This natural pride and ambition of the soul is very much gratified in the reading of a fable; for in writings of this kind, the reader comes in for half the performance, everything appears to him like a discovery of his own; he is busied all the while in applying the characters and circumstances, and is in this respect both a reader and a composer. It is no wonder, therefore, that on such occasions, when the mind is thus pleased with itself, and amused with its own discoveries, that it is highly delighted with the writing, which is the occasion of it.

This oblique^s manner of giving advice is so inoffensive, that, if we look into ancient histories, we find the wise men of old very often chose to give counsel to their kings in fables. To omit many, which will occur to every one's memory, there is a pretty instance of this nature in a Turkish tale.

We are told that the Sultan Mahmoud, by his perpetual wars abroad and his tyranny at home, had filled his dominions with ruin and desolation, and half unpeopled the Persian empire. The vizier of this great Sultan pretended to have learned of a certain dervish to understand the language of birds, so that there was not a bird that could open his mouth, but the vizier knew what it was he said. As he was one evening with the Emperor on their return from hunting, they saw a couple of owls upon a tree that grew near an old wall, out of a heap of rubbish.

"I would fain know," says the Sultan, "what those two owls are saying to one another; listen to their discourse, and give me an account of it."

The vizier approached the tree, pretending to be very attentive to the two owls.

Upon his return to the Sultan, "Sir," says he, "I have heard part of their conversation, but I dare not tell you what it is."

The Sultan would not be satisfied with such an answer, but forced him to repeat word for word what the owls had said.

"You must know then," said the vizier, "that one of these owls has a son, and the other a daughter, between whom they are now upon a treaty of marriage. The father of the son said to the father of the daughter in my hearing, 'Brother, I consent to this marriage, provided you will settle upon your daughter fifty ruined villages for her portion.' To which the father of the daughter replied, 'Instead of fifty, I will give her five hundred if you please. Allah grant a long life to Sultan Mahmoud! whilst he reigns over us, we shall never want ruined villages.'"

The story says the Sultan was so touched with the fable, that he rebuilt the towns and villages that had been destroyed, and from that time forward consulted the good of his people.

ADDISON.

1. POTION, a draught, a dose. (Lat. *poto*, to drink.)
 2. PALATABLE, agreeable to the palate or taste. *Palate*, the roof of the mouth touched by the food.
 3. HARMONIOUS NUMBERS, sounds arranged in harmonious verse.
 4. INSINUATE, to hint; to introduce gently or artfully. (Lat. *sinus*, a curve, and hence a gulf.)
 5. OBLIQUE, slanting; not straightforward.
 6. VIZIER, an Oriental prime minister or councillor of state.
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THE VANITY OF HUMAN GREATNESS.

CROMWELL,¹ I did not think to shed a tear
In all my miseries ; but thou hast forced me,
Out of thy honest truth, to play the woman.
Let's dry our eyes : and thus far hear me, Cromwell ;
And—when I am forgotten, as I shall be,
And sleep in dull cold marble, where no mention
Of me more must be heard of—say I taught thee,
Say, Wolsey—that once trod the ways of glory,
And sounded all the depths and shoals of honour—
Found thee a way, out of his wreck, to rise in ;
A sure and safe one, though thy master missed it.
Mark but my fall, and that, that ruined me.
Cromwell, I charge thee, fling away ambition ;
By that sin fell the angels ; how can man, then,
The image of his Maker, hope to win by't ?
Love thyself last : cherish those hearts that hate thee :
Corruption wins not more than honesty.
Still in thy hand carry gentle peace,
To silence envious tongues. Be just, and fear not :
Let all the ends thou aim'st at be thy country's,
Thy God's, and truth's ; then if thou fall'st, O Cromwell,
Thou fall'st a blessed martyr ! Serve the king ;
And—pr'ythee,² lead me in :
There take an inventory³ of all I have,
To the last penny ; 'tis the king's : my robe,
And my integrity to heaven, is all
I dare now call mine own. O Cromwell, Cromwell !
Had I but served my God with half the zeal
I served my king, He would not in mine age
Have left me naked to mine enemies.
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Farewell, a long farewell, to all my greatness !

This is the state of man : to-day he puts forth
 The tender leaves of hope ; to-morrow blossoms,
 And bears his blushing honours thick upon him :
 The third day comes a frost, a killing frost ;
 And—when he thinks, good easy man, full surely
 His greatness is a-ripening—nips his root,
 And then he falls, as I do. I have ventured,
 Like little wanton boys that swim on bladders,
 This many summers in a sea of glory ;
 But far beyond my depth : my high-blown pride
 At length broke under me ; and now has left me,
 Weary and old with service, to the mercy
 Of a rude stream that must for ever hide me.
 Vain pomp and glory of this world, I hate ye ;
 I feel my heart new open'd. Oh, how wretched
 Is that poor man that hangs on prince's favours !
 There is, betwixt that smile we would aspire to,
 That sweet aspect of princes, and their ruin,
 More pangs and fears than war or women have ;
 And when he falls, he falls like Lucifer,⁴
 Never to hope again.

SHAKESPEARE—"King Henry VIII."

1. CROMWELL. This speech, on the vanity of human greatness, is addressed by Cardinal Wolsey, the celebrated Minister of Henry VIII., to his secretary and friend, Thomas Cromwell, afterwards Earl of Essex. The occasion of the speech was the Cardinal's disgrace and banishment from court, after he had for many years held in it the highest place, next to the King himself.

2. PRYTHEE, I pray thee ; I entreat thee.

3. INVENTORY, a list or catalogue.

4. LUCIFER, Satan, often called in poetry Lucifer, or the Morning Star.

CONSTITUTIONAL GOVERNMENT CONTRASTED WITH DESPOTISM.

THAT form of government appears to me the most reasonable, which is most conformable to the regularity that we find in human nature, provided it be consistent with public peace and tranquillity. This is what may properly be called liberty, which exempts one man from subjection to another, so far as the order and economy of government will permit.

Liberty should reach every individual of a people, as they all share one common nature; if it only spreads among particular branches, there had better be none at all, since such a liberty only aggravates the misfortune of those who are deprived of it, by setting before them a disagreeable subject of comparison.

This liberty is best preserved when the legislative power is lodged in several persons, especially if those persons are of different ranks and interests; for when they are of the same rank, and consequently have an interest to manage peculiar to that rank, it differs but little from a despotic government in a single person. But the greatest security a people can have for their liberty, is when the legislative power is in the hands of persons so happily distinguished, that by providing for the particular interests of their several ranks, they are providing for the whole body of the people, or in other words, where there is no part of the people that has not a common interest with at least one part of the legislators.

If there be but one body of legislators, it is no better than a tyranny; if there be only two, there will want a casting voice, and one of them must at last be swallowed

up by the disputes and contentions which will necessarily arise between them. Four would have the same inconvenience, and a greater number would cause too much confusion.

History offers an unanswerable argument against despotic power. When the prince is a man of wisdom and virtue, it is indeed happy for his people that he is absolute ; but since in the common race of mankind, for one that is wise and good, you find ten of a contrary character, it is very dangerous for a nation to stand its chance, and to have its public happiness or misery, dependent on the virtues and vices of a single person. Look into the history of any series of absolute princes, how many tyrants must you read of, before you come to an emperor who is supportable. But this is not all ; an honest private man often grows cruel and abandoned, when converted into an absolute prince. Give a man the power of doing what he pleases with impunity, you extinguish his fear, and consequently overturn in him one of the great pillars of morality. This we find confirmed by facts. How many hopeful heirs-apparent¹ to grand empires, when in the possession of them, have become such monsters of lust and cruelty, as are a reproach to human nature.

It is odd to consider the connection between despotic governments and barbarity, and how the making of one person more than man makes the rest less.

Riches and plenty are the natural fruits of liberty, and where these abound, learning and all the liberal arts will immediately lift up their heads and flourish. As a man must have no slavish fears and apprehensions hanging upon his mind, who would indulge the flights of fancy or speculation, and push his researches into all the abstruse² corners of truth, so it is necessary for him to

have about him a competency of all the conveniences of life.

The first thing every one looks after is to provide himself with necessaries. This point will engross our thoughts till it be satisfied. If this is taken care of to our minds, we look out for pleasures and amusements; and among a great number of idle people there will be many, whose pleasures will lie in reading and contemplation. These are the two great sources of knowledge, and as men grow wise they naturally love to communicate their discoveries, and others seeing the happiness of such learned life, and improving by their conversation, emulate, imitate, and surpass one another, till a nation is filled with races of wise and understanding persons. Ease and plenty are therefore the great cherishers of knowledge: and as most of the despotic governments of the world have neither of them, they are naturally overrun with ignorance and barbarity. In Europe, indeed, although several of its princes are absolute, there are men famous for knowledge and learning; but the reason is, because the subjects are many of them rich and wealthy, the prince not thinking fit to exert himself in his full tyranny, like the princes of the eastern nations, lest his subjects should be invited to new-mould their constitution, having so many prospects of liberty within their view. But in all despotic governments, though a particular prince may favour art and letters, there is a natural degeneracy of mankind, as you may observe from Augustus's⁸ reign, how the Romans lost themselves by degrees, until they fell to an equality with the most barbarous nations, that surrounded them. Look upon Greece under its free states, and you would think that its inhabitants lived in different climates, and under different heavens, from those of the present; so different

are the characters, which are formed under Turkish slavery and Grecian liberty.

This natural tendency of despotic power to ignorance and barbarity, is, I think, an unanswerable argument against this form of government, as it shows how repugnant it is to the good of mankind, and the perfection of human nature, which ought to be the great ends of civil institutions.

ADDISON.

1. HEIRS-APPARENT, the apparent or acknowledged successors.

2. ABSTRUSE, hidden, difficult to be understood; lit. *thrust from*. (Lat. *abs*, from *trudo* to thrust.)

3. AUGUSTUS, the first and most famous of the Roman Emperors, born 63 B.C. died 14 A.D. During his reign Rome touched her highest point of glory. This prince favoured learned men, and encouraged talent of all kinds.

THE VISION OF WISDOM.

METHOUGHT I was just awoke out of a sleep, that I could never remember the beginning of; the place where I found myself to be, was a wide and spacious plain, full of people, that wandered up and down through several beaten paths, where some few were straight and in direct lines, but most of them winding and turning like a labyrinth;¹ and yet it appeared to me afterwards, that these last all met in one issue, so that many travellers that seemed to steer quite contrary courses, did at length meet and face one another, to the no little amazement of many of them.

In the midst of the plain there was a great fountain. They called it the spring of Self-love, out of it issued two rivulets to the eastward and westward; the name of the first was Heavenly-wisdom, its water was wonderfully

clear, but of a yet more wonderful effect ; the other's name was Worldly-wisdom, its water was thick and yet far from dormant² or stagnating, for it was in a continual violent agitation, which kept the travellers, whom I shall mention by-and-by, from being sensible of the foulness and thickness of the water ; which had this effect that it intoxicated those who drank it, and made them mistake every object, that lay before them : both rivulets were parted near their spring into as many others, as there were straight and crooked paths, which they attended all along to their respective issues.

I observed from the several paths, many travellers now and then diverge, to refresh and otherwise qualify themselves for their journey, to the respective rivulets which ran near them ; they contracted a very observable courage and steadiness in what they were about, by drinking these waters. At the end of the perspective³ of every straight path, all of which did end in one issue and point, appeared a high pillar, all of diamond, casting rays as bright as those of the sun into the paths ; which rays had also certain sympathising and alluring virtues in them, so that whosoever had made some considerable progress in his journey towards the pillar, by the repeated impression of these rays upon him, was wrought into an habitual inclination and attraction of his sight towards it ; so that it grew at last in a manner natural to him, to look and gaze upon it, whereby he was kept steady in the straight paths, which alone led to that radiant body, the beholding of which, was now grown a gratification to his nature.

At the issue of the crooked paths there was a great black tower, out of the centre of which streamed a long succession of flames, which did rise even above the clouds ; it gave a very great light to the whole plain, and did

sometimes outshine the light and oppress the beams of the adamantine⁴ pillar, though by the observation I made afterwards, it appeared that it was not any real diminution of light, but because the travellers would sometimes step out of the straight paths, when they lost the full prospect of the radiant pillar, and saw it but side-ways, while the great light from the black tower, which was somehow particularly scorching to them, would generally light and hasten them to their proper climate again.

Round about the black tower there were, methought, many thousands of huge, misshapen, ugly monsters; these had great nets which they were perpetually plying and casting towards the crooked paths, and they would now and then catch up those that were nearest to them; these they took up straight, and whirled over the walls into the flaming tower, and they were no more seen or heard of.

They would sometimes cast their nets towards the right paths to catch the stragglers, whose eyes, for want of frequent drinking at the brook that ran by them, grew dim, whereby they lost their way; these would sometimes very narrowly miss being caught away, but I could not hear whether any of these had ever been so unfortunate, who had before walked heartily in the straight paths.

I considered all these strange sights with great attention, until at last I was interrupted by a group of the travellers in the crooked paths, who came up to me, bid me go along with them, and presently fell to singing and dancing; they took me by the hand, and so carried me away along with them. After I had followed them a considerable while, I perceived I had lost the black tower of light; at which I greatly wondered; but as I looked and gazed round about me and saw nothing, I began to fancy my first vision had been but a dream, and there

was no such thing in reality; but then I considered that if I could, in fancy, see what was not, I might as well have an illusion wrought on me at present, and not see what was really before me. I was very much confirmed in this thought by the effect I then just observed the water of Worldly-wisdom had upon me; for as I had drunk a little of it again, I felt a very sensible effect in my head; methought it distracted and disordered all there; this made me stop on a sudden, suspecting some charm or enchantment. As I was casting about within myself what I should do, and whom to apply to in this case, I spied at some distance from me, a man beckoning, and making signs to me to come over to him. I cried to him, "I do not know the way." He then called to me audibly, to step at least out of the path I was in, for if I stayed there any longer I was in danger of being caught in a great net, that was just hanging over me and ready to fall; that he wondered I was so blind or so distracted, as not to see so imminent⁵ and visible a danger; assuring me that as soon as I was out of the way, he would come to me and lead me into a more secure path.

This I did, and he brought me his palm full of the water of Heavenly-wisdom, which was of very great use to me, for my eyes were straight cleared, and I saw the great black tower just before me; but the great net which I now spied near me, cast me into such a terror, that I ran back as far as I could in one breath, without looking behind me. Then my benefactor thus spoke to me: "You have made the most wonderful escape in the world; the water, you used to drink, is of a bewitching nature, you would else have been greatly shocked at the deformities and meanness of the place; for besides the set of blind fools in whose company you were, you may

now observe many others, who are only bewitched after another no less dangerous manner. Look a little that way ; there goes a crowd of passengers, they have indeed such good heads as not to suffer themselves to be blinded by this bewitching water ; the black tower is not vanished out of their sight, they see it whenever they look up to it ; but see how they go side-ways, and with their eyes downwards, as if they were mad, that they may thus rush into the net, without being beforehand troubled at the thought of so miserable a destruction. Their wills are so perverse, and their hearts so fond of the pleasures of the place, that rather than forego them they will run all hazards, and venture upon all the miseries and woes before them. See there that other company, though they should drink none of the bewitching water, yet they take a course bewitching and deluding ; see how they choose the crookedest paths, whereby they have often the black tower behind them, and sometimes see the radiant column sideways, which gives them some faint glimpse of it. These fools content themselves with that, not knowing whether any others have more of its influence and light than themselves ; this road is called that of Superstition, or Human Invention ; the people who walk along it, overlook that, which the rules and laws of the place prescribe to them, and contrive some other schemes and sets of directions and prescriptions for themselves, which they hope will serve their turn."

He showed me many other kinds of fools which put me quite out of humour with the place. At last he carried me to the right paths, where I found true and solid pleasure which entertained me all the way until we came in closer sight of the pillar, where my satisfaction increased to that measure that my faculties were not able to contain it ; in the straining of them I was

violently awakened, not a little grieved at the vanishing of so pleasing a dream.

ANONYMOUS, from "*The Spectator*."

1. LABYRINTH, a confused path ; an inexplicable difficulty ; originally, a famous building in Egypt, consisting of halls connected by intricate passages from which there appeared to be no issue.

2. DORMANT, at rest ; sleeping. (Lat. *dormio*, to sleep.)

3. PERSPECTIVE, a view, a vista, lit. *a looking through*; also, the art of delineating objects on a flat surface as they appear to the eye. (Lat. *specio*, to look.)

4. ADAMANTINE, made of diamond ; lit. *that which cannot be broken or penetrated*. (Gr. *a* not, and *damaō*, to break.)

5. IMMINENT, near at hand ; threatening to fall ; lit. *projecting over*.

THE LORD CHIEF-JUSTICE'S¹ VINDICATION OF HIS OFFICE AND AUTHORITY.

I THEN did use the person of your father ;
The image of his power lay then in me :
And, in the administration of his law,
Whiles I was busy for the commonwealth,
Your highness pleased to forget my place,
The majesty and power, of law and justice,
The image of the king whom I presented,
And struck me in the very seat of judgment :
Whereon, as an offender to your father,
I gave bold way to my authority,
And did commit you. If the deed were ill,
Be you contented, wearing now the garland,
To have a son set your decrees at nought ;
To pluck down justice from your awful bench ;
To trip the course of law, and blunt the sword,
That guards the peace and safety of your person :
Nay, more ; to spurn at your most royal image,

And mock your workings in a second body.
Question your royal thoughts, make the case yours ;
Be now the father, and propose a son :
Hear your own dignity so much profaned,
See your most dreadful laws so loosely slighted,
Behold yourself so by a son disdain'd ;
And then imagine me taking your part,
And, in your power, soft silencing your son.
After this cold considerance, sentence me ;
And, as you are a king, speak in your state,
What I have done that misbecame my place,
My person, or my liege's sov'reignty.

SHAKESPEARE— "*King Henry IV.*," *Part II.*

1. THE LORD CHIEF-JUSTICE, Sir William Gascoigne, Chief-Justice of the Court of King's Bench in the reign of Henry IV., who committed to prison Prince, afterwards King, Henry V., because he attempted to rescue one of his companions who had been condemned to punishment ; the Prince submitted to the Judge with a good grace, and afterwards treated him with respect and esteem.

BIOGRAPHICAL SKETCH OF WHITE OF SELBORNE.

THE Reverend Gilbert White was born in the village of Selborne in Hampshire, in the year 1720, and died in 1793.

More than forty years of his life were spent in his beautiful native village, in deep and loving study of the mysteries of nature, and he was the first man, who taught us, that Natural History was more than a mere dry classification of names and species : that the commonest object of creation, when carefully examined, and diligently watched, is calculated to excite our wonder, admiration, and interest.

The results of Mr White's observations were contributed in the form of letters to his friends, and the whole form one of

the most charming books in the English language, "The Natural History of Selborne," from whose pages the following extract is taken.

THE HOUSE-MARTIN.

IN obedience to your injunction I sit down to give you some account of the house-martin or martlet.

A few house-martins begin to appear about the sixteenth of April; usually some few days later than the swallows. For some time after they appear, the hirundines¹ in general pay no attention to the business of nidification,² but play and sport about, either to recruit from the fatigue of their journey, if they do migrate at all, or else that their blood may recover its true tone and texture, after it has been so long benumbed by the severities of winter.

About the middle of May, if the weather be fine, the martin begins to think in earnest of providing a mansion for his family.

The crust or shell of this nest seems to be formed of such dirt or loam, as comes most readily to hand, and is tempered and wrought together with little bits of broken straws, to render it tough and tenacious.³ As this bird often builds against a perpendicular wall without any projecting ledge under, it requires its utmost efforts to get the first foundation firmly fixed, so that it may safely carry the superstructure. On this occasion the bird not only clings with its claws, but partly supports itself by strongly inclining its tail against the wall, making that a fulcrum⁴; and, thus steadied, it works and plasters the materials into the face of brick or stone. But then that their work may not, while it is soft and green, pull itself down by its own weight, the provident

architect has prudence and forbearance enough not to advance the work too fast; but by building only in the morning, and dedicating the rest of the day to food and amusement, gives it sufficient time to dry and harden. About half an inch seems to be a sufficient layer for a day.

Thus careful workmen, when they build mud-walls (informed, at first, perhaps, by this little bird), raise but a moderate layer at a time, and then desist, lest the work should become top-heavy, and so be ruined by its own weight.

By this method, in about ten or twelve days, is formed a hemispheric nest with a small aperture towards the top, strong, compact, and warm; and perfectly fitted for all the purposes for which it was intended. But then nothing is more common than for the house-sparrow, as soon as the shell is finished, to seize on it as its own, to eject the owner, and to line it after its own manner.

After so much labour has been bestowed in erecting a mansion, as nature seldom works in vain, martins will breed on for several years together in the same nest, where it happens to be well sheltered and secure from the injuries of weather.

The shell or crust of the nest is a sort of rustic work full of knobs and protuberances⁵ on the outside; nor is the inside of those that I have examined smoothed with any exactness at all, but is rendered soft and warm by a lining of small straws, grasses, and feathers, and sometimes by a bed of moss interwoven with wool.

When the young martins arrive at their full growth, they soon become impatient of confinement, and sit all day long with their heads out at the orifice,⁶ where the mothers, by clinging to the nest, supply them with food from morning to night. For a time the young are fed

on the wing by their parents ; but the feat is done by so quick and almost imperceptible a sleight,⁷ that a person must have attended very exactly to their motions, before he would be able to perceive it.

As soon as the young are able to shift for themselves, the female martins immediately turn their thoughts to the business of a second brood ; while the first flight, shaken off and rejected by their nurses, congregate in great flocks, and are the birds that are seen clustering and hovering on sunny mornings and evenings round towers and steeples, and on the roofs of churches and houses. These congregatings usually begin to take place about the first week in August ; and therefore we may conclude, that by that time the first flight is pretty well over.

The young of this species do not quit their abodes all together ; but the more forward birds get abroad some days before the rest. These, approaching the eaves of buildings, and playing about before them, make people think that several old birds attend one nest.

Martins are often capricious in fixing on a nesting-place, beginning many edifices, and leaving them unfinished ; but, when once a nest is completed in a sheltered place, it serves for several seasons. Those which breed in a ready-finished house get the start, in hatching, of those that build a new one, by ten days or a fortnight. These industrious artificers are at their labours in the long days before four in the morning ; when they fix their materials they plaster them on with their chins, moving their heads with a quick vibratory⁸ motion. They dip and wash as they fly, sometimes in hot weather, but not so frequently as swallows. It has been observed that martins usually build to a north-east or north-west aspect, that the heat of the sun may

not crack and destroy their nests; but instances are also recorded of their breeding for many years in vast abundance, in a hot stifed inn-yard, against a wall facing the south.

Martins are by far the least agile of the four species of the English hirundines—the swallow, the swift, and the bank-martin. Their wings and tails are short, and therefore they are not capable of such surprising turns, and quick, glancing evolutions as the swallow. Accordingly they make use of a placid easy motion in a middle region of the air, seldom mounting to any great height, and never sweeping long together over the surface of the land or water. They do not wander far for food, but affect sheltered districts, over some lake, or under some hanging wood, or in some hollow vale, especially in windy weather. They breed the latest of all the swallow kind: in 1772 they had nestlings on October 21; and are never without unfledged young as late as Michaelmas.

As the summer declines, the congregating flocks increase in numbers daily, by the constant accession of the second broods, till at last they swarm in myriads round the villages on the Thames, darkening the face of the sky as they frequent the aits⁹ of that river, where they roost. They retire, the bulk of them I mean, in vast flocks together about the beginning of October; but have appeared of late years in a considerable flight in the neighbourhood of Selborne for one or two days, as late as November 5th or 6th, after they were supposed to have been gone for more than a fortnight. They therefore withdrew from us the latest of any species.

Unless these birds are very short-lived indeed, or unless they do not return to the district where they are

bred, they must undergo vast devastation somehow, and somewhere; for the birds that return yearly bear no manner of proportion to the birds that retire.

“*Natural History of Selborne*,” by GILBERT WHITE.

1. **HIRUNDINES**, a name given to all the swallow tribe, from the Latin name for swallow, *Hirundo*; the tribe includes swallows, swifts, martins, and sand-martins.

2. **NIDIFICATION**, the act of building a nest, of hatching and rearing young ones. (Lat. *nidus*, a nest; and *facio*, to make.)

3. **TENACIOUS**, apt to stick; holding fast. (Lat. *teneo*, to hold.)

4. **FULCRUM**, the fixed point on which a lever moves.

5. **PROTUBERANCES**, swellings; roughness rising in lumps. (Lat. *pro*, forward; *tuber*, a swelling.)

6. **ORIFICE**, an opening resembling a mouth.

7. **SLEIGHT**, cunning; dexterity.

8. **VIBRATORY**, shaking; trembling; swinging from side to side. (Lat. *vibro*, to shake.)

9. **AIT** a small island in a river or lake.

MERCY.

THE quality of mercy is not strained,¹—
 It droppeth as the gentle rain from heaven
 Upon the place beneath: it is twice bless'd,—
 It blesseth him that gives, and him that takes:
 'Tis mightiest in the mightiest; it becomes
 The thronèd monarch better than his crown;
 His sceptre shows the force of temporal power,
 The attribute² to awe and majesty,
 Wherein doth sit the dread and fear of kings:
 But mercy is above this sceptred sway,—
 It is enthronèd in the hearts of kings,
 It is an attribute to God Himself:
 And earthly power doth then show likest God's,

When mercy seasons justice. Therefore, Jew,
Though justice be thy plea, consider this,—
That, in the course of justice, none of us
Should see salvation : we do pray for mercy ;
And that same prayer doth teach us all to render
The deeds of mercy.

SHAKESPEARE—" *The Merchant of Venice*."

1. STRAINED, restrained, limited in any way.
2. ATTRIBUTE, that which belongs to, or is ascribed to. (Lat. *ad*, to ; *tribuo*, to give.)

DUKE OF GLOUCESTER'S SPEECH.

BRAVE peers of England, pillars of the state,
To you Duke Humphrey ¹ must unfold his grief,—
Your grief, the common grief of all the land.
What ! did my brother Henry spend his youth,
His valour, coin, and people, in the wars ?
Did he so often lodge in open field,
In winter's cold, and summer's parching heat,
To conquer France, his true inheritance ?
And did my brother Bedford ² toil his wits,
To keep by policy what Henry got ?
Have you yourselves, Somerset, Buckingham,
Brave York, Salisbury, and victorious Warwick,
Receiv'd deep scars in France and Normandy ?
Or hath mine uncle Beaufort and myself,
With all the learned council of the realm,
Studied so long, sat in the council-house
Early and late, debating to and fro
How France and Frenchmen might be kept in awe ?
And hath his highness in his infancy
Been crowned in Paris, in despite of foes ?

And shall these labours, and these honours, die ?
 Shall Henry's conquest, Bedford's vigilance,
 Your deeds of war, and all our counsel, die ?
 O peers of England, shameful is this league !
 Fatal this marriage³ ! cancelling⁴ your fame,
 Blotting your names from books of memory,
 Razing the characters of your renown,
 Defacing monuments of conquer'd France,
 Undoing all, as all had never been !

SHAKESPEARE.—"*King Henry VI.*," Part II.

1. DUKE HUMPHREY, the Duke of Glo'ster, brother of King Henry V., and uncle and guardian of Henry VI.

2. BEDFORD, John Duke of Bedford : brother to Henry V. and the Duke of Glo'ster.

3. THIS MARRIAGE. The proposed marriage between Henry VI. and Margaret of Anjou, by which the English were to give to her father (Regnier, titular King of Naples, &c.) the provinces of Maine and Anjou, which they had won from the French.

4. CANCEL, to cross, to erase. (Lat. *cancelli*, lattice-work.)

BIOGRAPHICAL SKETCH OF GIBBON THE HISTORIAN.

EDWARD GIBBON was born at Putney in Surrey, in the year 1737, and died in 1794.

He early showed a great taste for study, and in 1761 published an essay on the "Study of Literature," which gave him at once a place in the learned world. His most famous work is the "Decline and Fall of the Roman Empire." This history shows great learning and much deep research. The work has been translated into nearly all the languages of Europe.

After the death of Gibbon, his friend, Lord Sheffield, published his "Miscellaneous Works," from which the following extract is taken.

REMARKS ON READING.

READING is the nourishment of the mind ; for by reading we know our Creator, His works, ourselves chiefly and our fellow-creatures. But this nourishment is easily converted into poison.

Let us read with method and propose to ourselves an end to which all our studies may point. Through neglect of this rule, gross ignorance often disgraces great readers, who, by skipping hastily and irregularly from one subject to another, render themselves incapable of combining their ideas. So many detached parcels of knowledge cannot form a whole. This inconstancy weakens the energies of the mind, creates in it a dislike to application, and even robs it of the advantages of natural good sense.

Yet let us avoid the contrary extreme, and respect method, without rendering ourselves its slaves. While we propose an end in our reading, let not this end be too remote ; and when once we have attained, let our attention be directed to a different subject. Inconstancy weakens the understanding ; a long and exclusive application to a single object hardens and contracts it. Our ideas no longer change easily into a different channel, and the course of reading to which we have too long accustomed ourselves is the only one that we can pursue with pleasure.

The use of our reading is to aid us in thinking ; thus it often happens, that the perusal of a particular work gives rise to ideas unconnected with the subject of which it treats, and the results of these ideas may be very profitable.

To read with attention, exactly to define the ex-

pressions of our author, never to admit a conclusion without comprehending its reason, often to pause, reflect and interrogate ourselves, this is advice which it is easy to give, but difficult to follow.

But what ought we to read? Each individual must answer this question for himself, agreeably to the object of his studies. The only general precept that I would venture to give, is that of Pliny,¹ "to read much, rather than many things;" to make a careful selection of the best works, and to render them familiar to us by attentive and repeated perusals.

GIBBON.

1. PLINY, there were two famous Roman scholars and philosophers of this name. The elder Pliny was born 23 A.D., and was killed in an eruption of Vesuvius in 79 A.D. His nephew, Pliny the younger, was born 62 A.D., and died 110 A.D., after a life devoted to the noblest pursuits and enjoyments. It is the younger Pliny who is referred to in this passage.

THE ENGLISH PARLIAMENT.

THERE is no doubt that our Saxon ancestors brought with them from their German forests a form of government which was free in most essential points, and it is highly probable that to the Saxon Witenagemot, or meeting of wise men, the English parliament¹ owes its origin. Public assemblies were certainly held in England from very early Saxon times, for the discussion of public affairs.

After the Norman Conquest great public councils were repeatedly summoned by the Norman kings, but these councils appear to have been exclusively composed of the great barons, and churchmen of high rank.

Richard I. held five parliaments, of bishops and barons, but many edicts were made by him without any mention of their being enacted by the advice and consent of his

barons. At a general assembly held in the fifteenth year of the reign of John, Stephen Langton, Archbishop of Canterbury, showed to the bishops and barons in council a copy of the charter² of Henry I., and exhorted them to insist upon the renewal and observance of it. This famous charter contained in substance a recital of the liberties, which the people of England had enjoyed under the Saxon kings, and in particular under Edward the Confessor. The barons bound themselves by an oath to demand from John, the re-establishment of the laws of Edward the Confessor, and the other rights and privileges contained in this charter of Henry I. This demand gave rise to a civil war, and John, being defeated, unwillingly consented to sign that great charter of our common liberties, usually known as *Magna Charta*, A.D. 1215.

During the latter years of Henry the Third's reign, and during the civil wars, several general councils were held by the barons without the king's consent, and in 1264, after the battle of Lewes, in which Henry was defeated, they compelled him to summon a parliament, generally allowed to be the first, in which the counties were all represented. The following year, 1265, is by most authorities assigned as the period, at which representative parliament may be considered as properly commencing. Early in that year, writs were sent to the nobles and the sheriffs of the several counties, by the Earl of Leicester in the king's name, enjoining the latter to return two knights for each county, two citizens for each city, and two burgesses³ for each borough; the latter being a class of persons, hitherto considered as too mean to have a place in the national councils.

Edward I., in his first parliament, 1274, enacted laws for securing the peace and liberties of the people, the

immunities⁴ of the Church, and the privileges of the clergy. These laws are called the Statutes of Westminster, and the first mention of the word *parliament*, in the English Statute Law, occurs in the preamble to them. The same king's parliament of 1295, shows beyond a doubt, that cities and boroughs sent representatives to parliament, in addition to the knights of the shires. The representatives were, at this period, and long after, paid by their constituents, and some of the boroughs, in consequence of the pressure of this expense, sought to be, and were, released from exercising the elective franchise. At a parliament summoned by Edward I. in 1297, the king, as feudal lord, demanded the assistance of his earls, barons, and knights, who held of him as tenants *in capite*, or tenants in chief, to the amount of twenty pounds a year, either to go in person to Flanders, or to contribute to the expedition. Many of the barons and knights refused to go, and would not even agree to the contribution, unless it was ordained by common consent of parliament. After a brief struggle the king yielded, making the important concession,—that for the future he would not attempt to levy any tax or aid, without the consent of the archbishops, bishops, and other prelates, and the earls, barons, knights, burgesses, and other foremen of the realm.

In the year 1330, the beginning of the reign of Edward III., it was enacted that the king should hold a parliament every year, or oftener *if need be*. At this period the transactions of parliament were despatched with great rapidity, the business of a session being often disposed of in a week or ten days. In 1342, the knights of the shires, who had hitherto been members of the Upper House, began to sit with the citizens and

burgesses, and this division shortly afterwards became permanent. In the year 1377, the first of the reign of Richard II., is recorded for the first time, the election of a Speaker⁵ of the Commons. In 1399, the parliament solemnly deposed Richard II., and writs⁶ were issued immediately in the name of the new King, Henry IV. The representatives of the Commons more than once during this reign, used great freedom in remonstrating with the king. In 1404 they required the immediate removal of four persons from the royal household, and the king consented with reluctance, saying that "he knew no cause why they should be removed, but only because they were hated by the people."

The statute, which renders the reign of Henry VI. memorable in the annals of the English parliament, is one passed in the eighth year of it, by which the privilege of voting for knights of the shire, was confined to persons possessing lands or tenements to the annual value of *forty shillings* at the least, a sum of course far greater than the same nominal amount at the present day. The first parliament of Edward IV., in 1472, was the longest in duration that had hitherto sat, continuing two years and a half. During the short nominal reign of Edward V. no parliament was held, but one summoned by Richard III. in 1483, declared him to be elected king by the lords spiritual and temporal, and the Commons. Henry VII. asserted considerable authority over his parliaments, and even forced the Commons to make his notorious minister, Dudley, their Speaker. However, the privileges of the House of Commons were, in many ways, materially increased, during this reign, Henry VIII. endeavoured to free himself from all control of the Commons, in the disposal of the national wealth. He attempted in 1522, after declaring war

against France, to raise money without any parliamentary authority, and Wolsey, his minister, did his best to encourage his despotic inclinations. The duration of parliament was, in this reign, protracted to an extent hitherto unknown. Instead of being dissolved after a single session, they were from time to time prorogued. All the parliaments of Henry VIII. were remarkable for their subserviency to the will of that monarch, who in return permitted them to enjoy privileges of a more and more extensive character. The eldest sons of peers were permitted to sit in the House of Commons, by one of the first enactments of the reign of Edward VI.

Soon after Elizabeth's accession, a dispute arose between her and the Commons. The latter had urged the marriage of the queen, but Elizabeth was determined that they should not interfere in her private affairs. She summoned thirty of the members before her, severely rebuked them, and made them crave her pardon. She interfered with her parliaments frequently, and enforced her prerogative,⁷ from time to time, in a very arbitrary manner.

In the first parliament of James I. were seen the preparations for that collision between the prerogative of the king, and the privileges of the parliament, which was to come to so awful a crisis in the next reign. James was engaged in an almost continual struggle with his parliament, and his endeavours to enforce, what he considered his royal prerogative, were repeatedly and successfully resisted by the Commons.

The first parliament of Charles I. refused the king the necessary supplies of money. And the second, summoned in 1626, pursued the same line of conduct, only voting some very inadequate sums. Charles was obliged to have recourse to illegal exactions to supply his wants ;

to the imposts of ship-money and tonnage and poundage in particular. Of these and of various other extortions the Commons bitterly complained, and finally, in 1629, after some very violent measures on both sides, the king dissolved the parliament then sitting and resolved not to call another. However, after a lapse of eleven years, writs were issued for new elections, and the famous Long Parliament met on Nov. 3, 1640. The civil war began in 1642, and in 1649, one week after the execution of the king, the Commons passed a resolution abolishing the House of Peers, and on the next day the "Commonwealth" was established. The Long Parliament, with numerous alterations and interruptions, continued to exist until the Restoration of Charles II in 1660. The most remarkable Act passed by parliament in his reign was the famous Habeas Corpus Act.⁸ James II. called only one parliament, which he dissolved on the Commons addressing a remonstrance to him upon his employing Roman Catholics in the army. On James's flight from the kingdom a parliament, or "convention" as it was termed, summoned by the Prince of Orange, declared the throne vacant, and next passed the bill which settled the crown on the Prince and Princess of Orange, William and Mary. To this settlement of the crown was annexed a declaration, commonly called "the Bill of Rights," in which the powers of the royal prerogative were more narrowly circumscribed and more exactly defined than at any former period of the English government. The most remarkable parliaments since the Revolution of 1689, have been the following. The first parliament of Great Britain, which met in 1707, after the Union with Scotland; the parliament which met in the third year of George the First's reign, and enacted that parliaments, in future, should continue for seven years; the first parlia-

ment of Great Britain and Ireland which met after the Union with Ireland in 1801 ; the parliament which in 1832 passed the Reform Bill, and the parliament which in 1846 passed the repeal of the Corn Laws.

1. PARLIAMENT, (Fr. *parlement*, from *parler*, to speak or talk.)
2. CHARTER, a formal written document conferring or confirming titles, rights, or privileges.
3. BURGESS, an inhabitant of a borough.
4. IMMUNITY, freedom from obligation or duty. (Lat, *immunitas*, *in*, not, *munus*, duty.)
5. SPEAKER, the person chosen to preside in the House of Commons.
6. WRIT, a written document by which one is summoned or required to do something.
7. PREROGATIVE, an exclusive or peculiar privilege.
8. HABEAS CORPUS ACT, a celebrated Act of Parliament passed in the reign of Charles II. By this Act it is forbidden to send any one to a prison beyond the sea. No judge, under severe penalties, must refuse to any prisoner a writ of *habeas corpus*, by which the gaoler is directed to produce in court the *body* of the prisoner (whence the writ had its name), and to certify the cause of his detainer and imprisonment.

SUNDAY.

O DAY most calm, most bright,
 The fruit of this, the next world's bud,
 The indorsement¹ of supreme delight,
 Writ by a friend, and with His blood,
 The couch of time, care's balm and bay,
 The week were dark but for thy light,
 Thy torch doth show the way.

Man had straight forward gone
 To endless death, but thou dost pull,
 And turn us round to look on One,
 Whom, if we were not very dull

We could not choose but look on still,
Since there is no place so alone
The which He doth not fill.

Sundays the pillars are
On which Heaven's palace archèd lies ;
The other days fill up the space
And hollow room, with vanities ;
They are the fruitful beds and borders
In God's rich garden ; that is bare
Which parts their ranks and orders.

The Sundays of man's life,
Threaded together on Time's string,
Make bracelets to adorn the wife²
Of the eternal glorious King.
On Sunday Heaven's gate stands ope ;
Blessings are plentiful and rife,³
More plentiful than hope.

Thou art a day of mirth,
And when the week-days trail on ground,
Thy flight is higher, as thy birth,
Oh, let me take thee at the bound,
Leaping with thee from seven to seven,
Till that we both, being tossed from earth,
Fly hand in hand to Heaven.

GEORGE HERBERT.⁴

. **INDORSEMENT**, sanction or permission given to anything ; lit. *writing upon the back*. (Lat. *dorsum*, the back.)

. **WIFE**, &c., this means the Church, which is often called "the Lamb's wife" (see Rev. xix. v. 7. 8).

. **RIFE**, abundant.

. **GEORGE HERBERT**, see biographical sketch, FIFTH BOOK, p. 216.

BIOGRAPHICAL SKETCH OF ARCHDEACON PALEY.

WILLIAM PALEY, the celebrated theologian, was born at Peterborough in 1743, and died in 1805.

His father was a clergyman, and the younger Paley, after a successful career at college, embraced the same profession, in which he attained to considerable eminence ; he is, however, chiefly famous for his literary labours ; his last work, "Natural Theology," was so favourably received, that it reached the tenth edition in less than three years. The best known of his other works are, "Elements of Moral and Political Philosophy," and "The Evidences of Christianity."

HAPPINESS FOUND THROUGHOUT CREATION.

WE cannot help acknowledging what an exertion of benevolence creation was ; of a benevolence how minute in its care, how vast in its comprehension.

It is a happy world after all ; the air, the earth, the water, teem¹ with delighted existence. In a spring noon, or summer evening, on whichever side I turn my eyes, myriads² of happy beings crowd my view. Swarms of new-born *flies* are trying their pinions in the air. Their sportive motions, their wanton ways, their gratuitous³ activity, their continual change of place without use or purpose, testify their joy, and the exultation which they feel in their lately discovered faculties.⁴

A *bee* among the flowers in spring is one of the most cheerful objects, that can be looked upon. Its life appears to be all enjoyment, so busy and so pleased ; yet it is only a specimen of insect life, with which, by reason of the animal being half domesticated, we happen to be better acquainted than we are with that of others.

The whole winged insect tribe, it is probable, are equally intent upon their proper employments, and under every variety of constitution, gratified, and perhaps equally gratified by the offices which the Author of their nature has assigned to them. But the atmosphere⁵ is not the only scene of enjoyment for the insect race. Plants are covered with *aphides*,⁶ greedily sucking their juices, and constantly, as it would seem, in the act of so doing. It cannot be doubted but that this is a state of gratification. What else should fix them so close to the operation, and so long? Other species are running about, with an alacrity in their motions which carries with it every mark of pleasure. Large patches of ground are sometimes half covered with those brisk and sprightly natures.

If we look to what the waters produce, shoals of the fry¹ of fish frequent the margins of rivers, of lakes, and of the sea itself. These are so happy, that they know not what to do with themselves. Their attitudes, their vivacity, their leaps out of the water, their frolics in it (which I have noticed a thousand times with equal attention and amusement), all conduce to show their excess of spirits, and are simply the effects of that excess. Walking by the sea-side in a calm evening upon a sandy shore, and with an ebbing tide, I have frequently remarked the appearance of a dark cloud, or rather thick mist, hanging over the edge of the water, to the height perhaps of half a yard, and of the breadth of two or three yards, stretching along the coast as far as the eye could reach, and always retiring with the water. When this cloud came to be examined, it proved to be nothing else than so much space filled with young *shrimps*, in the act of bounding into the air from the shallow margin of the water, or from the wet sand. If any motion of a dumb

animal could express delight, it was this ; if they had meant to make signs of their happiness, they could not have done it more intelligibly.⁸

The young of all animals appear to me to receive pleasure simply from the exercise of their limbs and bodily faculties, without reference to any end to be attained, or any use to be answered, by the exertion. A child is delighted with speaking, without having anything to say ; and with walking, without knowing where to go.

But it is not for youth alone, that the great Parent of Creation hath provided. Happiness is found with the purring cat, no less than with the playful kitten ; in the arm-chair of dozing age, as well as in the sprightliness of the dance, or the animation of the chase. To novelty, to acuteness of sensation, to hope, to ardour of pursuit, succeeds what is, in no inconsiderable degree, an equivalent⁹ for them all, "the perception of ease." Herein is the exact difference between the pleasures of the young and the old. The young are not happy but when enjoying pleasure ; the old are happy when free from pain. And these constitutions suit with the degrees of animal power, which they respectively possess. The vigour of youth has to be stimulated¹⁰ to action by impatience of rest ; whilst to the weakness of age, quietness and repose become positive gratifications. In one important respect the advantage is with the old. A state of ease is, generally speaking, more attainable than one of pleasure. A constitution, which can enjoy ease, is preferable to that, which can taste only pleasure.

The appearance of satisfaction, with which most animals, as their activity subsides, seek and enjoy rest, affords reason to believe, that this sort of gratification is appointed to advanced life under all or most of its

various forms. In the species, with which we are best acquainted, namely our own, I am far, even as an observer of human life, from thinking that youth is its happiest season, much less the only happy one. As a Christian, I am willing to believe, that there is a great deal of truth in the following representation : "To the intelligent and virtuous, old age presents a scene of tranquil enjoyments, of obedient appetites, of well-regulated affections, of maturity in knowledge, and of calm preparation for immortality. In this serene and dignified state, placed, as it were, on the confines¹¹ of two worlds, the mind of a good man reviews what is past with the complacency¹² of an approving conscience ; and looks forward with humble confidence in the mercy of God, and with devout aspirations,¹³ towards His eternal and ever-increasing favour."

PALEY.

1. TEEM, to be fruitful.

2. MYRIADS, an immense number.

3. GRATUITOUS, free ; done or given gratis, or for nothing. (Lat. *gratia*, favour.)

4. FACULTY, the power of performing anything. (Lat. *facilis*, easy.)

5. ATMOSPHERE, the air which surrounds the earth.

6. APHIDES. The plural of APHIS, a genus of minute insects very injurious to vegetation. Their colour is generally green, and they are found in abundance on the rose and other plants.

7. FRY OF FISH, a swarm of fish just spawned.

8. INTELLIGIBLY, in a manner easy to understand. (Lat. *intelligo*, to understand.)

9. EQUIVALENT, a thing equal to another in power or effect.

10. STIMULATED, encouraged.

11. CONFINES, borders, limits. (Lat. *finis*, the end.)

12. COMPLACENCY, satisfaction, pleasure. (Lat. *placere*, to please.)

13. ASPIRATIONS, the eager desire for something elevated or above us : hopes. (Lat. *spiro*, to breathe.)

OLD AGE.

To you the beauties of the autumnal year
Make mournful emblems, and you think of man
Doom'd to the grave's long winter, spirit-broken,
Bending beneath the burden of his years,
Sense dulled and fretful, "full of aches and pains,"
Yet clinging still to life. To me they show
The calm decay of nature, when the mind
Retains its strength, and in the languid eye,
Religion's holy hope kindles a joy,
That makes old age look lovely.

SOUTHEY.

BIOGRAPHICAL SKETCH OF THE POET
SHIRLEY.

JAMES SHIRLEY was born in 1594 and died in 1656. He composed several dramas of considerable merit, which obtained for him the notice of Henrietta Maria, the Queen of Charles I. He was a faithful and devoted royalist, served in the civil wars under the Duke of Newcastle.

Besides his dramas, Shirley wrote several short poems, and the one here given has been likened to a piece of "massive gold."

DEATH'S FINAL CONQUEST.

THE glories of our birth and state
Are shadows, not substantial things,
There is no armour against fate :
Death lays his icy hand on kings.
Sceptre and crown
Must tumble down,

And in the dust be equal made,
With the poor crooked scythe and spade.

Some men with swords may reap the field,
And plant fresh laurels where they kill ;
But their strong nerves at last must yield,
They tame but one another still :

Early or late
They stoop to fate,
And must give up their murmuring breath,
When they, pale captives, creep to death.

The garlands wither on your brow ;
Then boast no more your mighty deeds ;
Upon Death's purple altar now,
See where the victor victim bleeds :

All heads must come
To the cold tomb ;
Only the actions of the just,
Smell sweet, and blossom in the dust.

SHIRLEY.

CIVIL LIBERTY.

CIVIL¹ liberty is the not being restrained by any law but what conduces in a greater degree to the public welfare.

To do what we will is natural liberty : to do what we will consistently with the interest of the community to which we belong, is civil liberty ; that is to say, the only liberty to be desired in a state of civil society.

I should wish, no doubt, to be allowed to act in every instance, as I please, but I reflect that the rest of mankind would then do the same ; in which state of universal independence and self-direction, I should meet with so many

checks and obstacles to my own will, from the interference and opposition of other men's, that not only my happiness, but my liberty, would be less than whilst the whole community were subject to the dominion of equal laws.

The boasted liberty of a state of nature exists only in the state of solitude. In every kind and degree of union and intercourse with his species, it is possible that the liberty of the individual may be augmented² by the very laws which restrain it; because he may gain more from the limitation of other men's freedom, than he suffers by the diminution of his own. Natural liberty, is the right of common upon a waste; civil liberty, is the safe, exclusive, unmolested enjoyment of a cultivated enclosure.

The definition of civil liberty above laid down imports, that the laws of free people impose no restraint upon the private will of the subject, which do not conduce in a *greater degree* to the public happiness.

Thus we are able to comprehend the distinction between *personal* and *civil* liberty. A citizen of the freest republic in the world may be imprisoned for his crimes: and though his personal freedom be restrained by bolts and fetters, so long as his confinement is the effect of a beneficial public law, his civil liberty is not invaded. And if this be true of the coercion³ of a prison, that it is compatible with a state of civil freedom, it cannot with reason be disputed of those more moderate constraints, which the ordinary operation of government imposes upon the will of the individual. It is not the rigour, but the inexpediency of laws and acts of authority, which make them tyrannical.

There is another idea of civil liberty, which, though neither so simple nor so accurate as the former, agrees better with the signification, which the usage of common

discourse, as well as the example of many respectable writers upon the subject, has affixed to the term. This idea places liberty in security, making it to consist not merely of an actual exemption from the constraint of useless and noxious⁴ laws and acts of dominion, but in being free from the *danger* of having such hereafter imposed and exercised. The loss of this security we denominate the loss of liberty: thus the Act of Parliament, in the reign of Henry VIII., which gave to the king's proclamation the force of law, has properly been called a complete and formal surrender of the liberty of the nation; and would have been so, although no proclamation were issued in pursuance of these new powers, or none but what was recommended by the highest wisdom and ability. The security was gone. PALEY.

1. CIVIL, pertaining to internal policy, government, and order. Lit. *belonging to a city*. (Lat. *civis*, a citizen.)

2. AUGMENTED, increased, grown larger. (Lat. *augeo*, to increase.)

3. COERCION, act of restraint or compulsion. (Lat. *arceo*, to shut in.)

4. NOXIOUS, hurtful, destructive. (Lat. *noceo*, to hurt.)

BIOGRAPHICAL SKETCH OF THE POET MILTON.

JOHN MILTON was born in London in 1608, and died in 1674. He received an excellent education, and passed his time in study and travel, until the Rebellion of 1642, in which he took an important part, supporting the parliamentary party with earnest essays, &c., in favour of freedom of thought and liberty of conscience. He was appointed Latin secretary to the Council of State, and afterwards to the Protector Cromwell. On the Restoration he was arrested and imprisoned, but after some time he was released, and suffered to sink into a seclusion, in which he died, poor and forgotten.

In his old age Milton became quite blind, and the wonderful poems, which have earned for him such lasting and well-merited fame, were dictated by the blind poet and transcribed¹ by his wife and daughters. The most valued of these is "Paradise Lost," which may truly be regarded as "one of the most sublime productions of the human mind," both in design and in execution; and whether we consider the powerful delineation² of character, or the exquisite beauty of the descriptions contained in this wonderful poem, we find our admiration equally excited.

Milton's prose works are now little read. His poetical works include "Paradise Regained," a sequel to "Paradise Lost," but much inferior; "L'Allegro," "Il Penseroso," "Comus," &c.

1. TRANSCRIBED, copied, written. (Lat. *scribo*, to write.)

2. DELINEATION, a representation or description. (Lat. *linea*, a line.)

MORNING HYMN OF ADAM AND EVE.

THESE are Thy glorious works, Parent of good,
Almighty! Thine this universal frame
Thus wondrous fair: Thyself how wondrous then,
Unspeakable! who sittest above these heavens,
To us invisible, or dimly seen
In these Thy lowest works; yet these declare
Thy goodness beyond thought, and power divine.
Speak, ye who best can tell, ye sons of light,
Angels! for ye behold Him, and with songs
And choral symphonies,¹ day without night,
Circle His throne rejoicing; ye in heaven,
On earth join all ye creatures to extol
Him first, Him last, Him midst, and without end.
Fairest of stars,² last in the train of night,
If better, thou belong not to the dawn,
Sure pledge of day that crownest the smiling morn,
With thy bright circlet praise Him in thy sphere,

While day arises, that sweet hour of praise.
Thou sun, of this great world both eye and soul,
Acknowledge Him thy greater ; sound His praise
In thy eternal course, both when thou climbest,
And when high noon hast gained, and when thou
fallest.

Moon that now meets the orient ³ sun, now fliest
With the fixed stars, fixed in their orb that flies,
And ye five other wandering fires,⁴ that move
In mystic dance not without song, resound
His praise, who out of darkness called up light.
Air, and ye elements, the eldest birth
Of nature's womb, that in quaternion ⁵ run
Perpetual circle, multiform ; and mix
And nourish all things ; let your ceaseless change
Vary to our great Maker still new praise.
Ye mists and exhalations, that now rise
From hill or streaming lake, dusky or gray,
Till the sun paint your fleecy skirts with gold ;
In honour of the world's great Author, rise ;
Whether to deck with clouds the unclouded sky,
Or wet the thirsty earth with falling showers,
Rising or falling, still advance His praise.
His praise, ye winds that from four quarters blow,
Breathe soft or loud ; and wave your tops, ye pines,
With every plant, in sign of worship wave.
Fountains, and ye that warble, as ye flow,
Melodious murmurs, warbling, tune His praise.
Join voices, all ye living souls ; ye birds,
That, singing up to heaven's gate, ascend,
Bear on your wings, and in your notes, His praise.
Ye that in waters glide, and ye that walk
The earth, and stately tread, or lowly creep.
Witness if I be silent, morn or even,

To hill or valley, fountain or fresh shade,
 Made vocal by my song and taught His praise.
 Hail, universal Lord, be bounteous still
 To give us only good ; and if the night
 Have gathered aught of evil, or concealed,
 Disperse it, as now light dispels the dark.

"Paradise Lost"—MILTON.

1. SYMPHONIES, harmonious sounds. CHORAL SYMPHONIES, a full band of voices, singing together in harmony.

2. FAIREST OF STARS, the morning and evening stars, which are seen first after sunset, and for some little time after sunrise ; the planets, Jupiter and Venus, are alternately the morning and evening stars.

3. ORIENT, eastward, the part where the sun rises. (Lat. *orior*, to rise.)

4. FIVE OTHER WANDERING FIRES, the planets, of which only seven were known at this time.

5. QUATERNION, a company composed of four. The word here has reference to the four so-called elements, earth, air, fire, and water.

SATAN'S ADDRESS TO THE SUN.

OH thou, that with surpassing glory crowned,
 Lookest from thy sole dominion like the god
 Of this new world ; at whose sight all the stars
 Hide their diminished heads ; to thee I call,
 But with no friendly voice, and add thy name,
 O sun ! to tell thee how I hate thy beams,
 That bring to my remembrance from what state
 I fell, how glorious once above thy sphere,
 Till pride and worse ambition threw me down,
 Warring in heaven against heaven's matchless King.
 Ah, wherefore ? He deserved no such return
 From me, whom He created what I was
 In that bright eminence, and with His good
 Upbraided none ; nor was His service hard ;
 What could be less than to afford Him praise,

The easiest recompense, and pay Him thanks
How due ! Yet all His good proved ill in me.
I wrought but malice ; lifted up so high
I disdained subjection, and thought one step higher
Would set me highest, and in a moment quit
The debt immense of boundless gratitude,
So burdensome, still paying, still to owe ;
Forgetful what from Him I still received.
And understood not that a grateful mind
By owing, owes not, but still pays, at once
Indebted and discharged. What burden then ?
Oh, had His powerful destiny ordained
Me some inferior angel. I had stood
Then happy ; no unbounded hope had raised
Ambition ; yet why not ? Some other power
As great might have aspired, and me, though mean,
Drawn to his part. But other powers as great
Fell not, but stand unshaken, from within
Or from without, to all temptations armed.
Hadst thou the same free will and power to stand ?
Thou hadst. Whom hast thou then or what to accuse
But heaven's free love dealt equally to all ?
Be then His love accursed, since love or hate
To me alike, it deals eternal woe.
Nay, cursed be thou, since against His thy will
Chose freely what it now so justly rues.
Me miserable ! which way shall I fly
Infinite wrath and infinite despair ?
Which way I fly is hell ; myself am hell ;
And, in the lowest depth a lower deep,
Still threatening to devour me, opens wide,
To which the hell I suffer seems a heaven.
Oh, then, at last relent. Is there no place
Left for repentance, none for pardon left ?

None left but by submission ; and that word
Disdain forbids me, and my dread of shame
Among the spirits beneath, whom I seduced
With other promises and other vaunts
Than to submit, boasting I could subdue
The Omnipotent ! Ah me ! they little know
How dearly I abide that boast so vain,
Under what torments inwardly I groan,
While they adore me on the throne of hell,
With diadem and sceptre high advanced,
The lower still I fall, only supreme
In misery : such joy ambition finds.
But say I could repent, and could obtain
By act of grace, my former state ; how soon
Would height recall high thought, how soon unsay
What feigned submission swore ! Ease would recant
Vows made in pain, as violent and void ;
For never can true reconciliation grow
Where wounds of deadly hate have pierced so deep ;
Which would but lead me to a worse relapse
And heavier fall ; so should I purchase dear
Short intermission bought with double smart.
This knows my punisher ; therefore as far
From granting He, as I from begging peace.
All hope excluded thus, behold, instead
Of us outcast, exiled, His new delight,
Mankind, created, and for him this world.
So farewell hope, and with hope farewell fear ;
Farewell remorse : all good to me is lost.
Evil be thou my good ; by thee at least
Divided empire with heaven's King I hold
By thee ; and more than half perhaps will reign,
As man, ere long, and this new world shall know.

"Paradise Lost"—MILTON.

NELSON, THE EFFECTS OF HIS DEATH.

HORATIO, Lord Nelson, was perhaps the most famous of English seamen; he was born at Burnham Thorpe, Norfolk, in 1758, and died at the battle of Trafalgar in 1805. He was slain at the very moment of victory, and the effects of his death are thus forcibly described by Southey.¹

"The death of Nelson was felt in England as something more than a public calamity: men started at the intelligence and turned pale, as if they had heard of the loss of a dear friend. An object of our admiration and affection, of our pride and of our hopes, was suddenly taken from us; and it seemed as if we had never, until then, known how deeply we loved and revered him.

"What the country had lost in its great naval hero, the greatest of our own and of all former times, was scarcely taken into the account of grief. So perfectly indeed had he performed his part, that the maritime war, after the battle of Trafalgar, was considered at an end. The fleets of the enemy were not merely defeated but destroyed: new navies must be built, and a new race of seamen reared for them, before the possibility of their invading our shores could again be contemplated.

"It was not therefore from any selfish reflection upon the magnitude of our loss that we mourned for him: the general sorrow was of a higher character. The people of England grieved that funeral ceremonies, and public monuments, and posthumous rewards, were all that they could now bestow upon him, whom the king, the legislature, and the nation, would have alike "delighted to honour;" whom every tongue would have blessed; whose presence in every village, through which he might

have passed, would have wakened the church-bells, have given the school-boys a holiday, have drawn the children from their sports to gaze upon him, and old men from the chimney corner to look upon Nelson, ere they died.

"The victory of Trafalgar³ was celebrated, indeed, with the usual forms of rejoicing, but they were without joy; for such already was the glory of the British navy, through Nelson's surpassing genius, that it scarcely seemed to receive any addition from the most signal victory that ever was achieved upon the seas; and the destruction of the mighty fleet, by which all the maritime schemes of France were totally frustrated, hardly appeared to add to our security or strength; for, while Nelson was living to watch the combined squadrons of the enemy, we felt ourselves as secure as now, when they were no longer in existence.

"There was reason to suppose, that, in the course of nature, Lord Nelson might have attained to a good old age. Yet he cannot be said to have fallen prematurely whose work was done; nor ought he to be lamented, who died so full of honours, and at the height of human fame." "The Life of Nelson," by ROBERT SOUTHEY.

1. SOUTHEY, see biographical sketch, Fifth Book, p. 86.

2. POSTHUMOUS, something coming after death.

3. TRAFALGAR, the battle was fought on October 21, 1805, about seven miles east of Cape Trafalgar, south of Spain, between the French and Spaniards on one side, and the English on the other. The latter were completely successful; twenty-four of the enemy's ships were taken and destroyed, and the French navy was nearly annihilated. Nelson's last signal to his men in this famous engagement was indeed warmly responded to by them: *England expects every man to do his duty.*

BIOGRAPHICAL SKETCH OF THE POET THOMSON.

JAMES THOMSON was born at Ednam, in Roxburgh, in 1700, and died at Kew in 1748.

His love of Nature and poetry induced him to prefer poverty and freedom to the steady work of a profession, for which he felt himself unsuited. But his talents soon raised him from obscurity : he gained many friends, and the Prince of Wales granted him a pension of £100 a year.

Thomson's chief works are "The Seasons," "Liberty," "The Castle of Indolence," and several tragedies. Of all these, "The Seasons" is undoubtedly his best production ; the style is redundant and wanting in simplicity, but it is rich in imagery, faithful in description, pure and healthy in sentiment.

It was said of him by Lord Lyttelton that his works contained—

" No line which, dying, he could wish to blot."

HYMN TO THE SEASONS.

THESE, as they change, Almighty Father, these
Are but the varied God. The rolling year
Is full of Thee. Forth in the pleasing Spring
Thy beauty walks, Thy tenderness, and love.
Wide flush the fields ; the softening air is balm ;
Echo the mountains round ; the forest smiles ;
And every sense, and every heart, is joy.
Then comes Thy glory in the Summer months,
With light and heat refulgent. Then Thy sun
Shoots full perfection through the swelling year.
And oft Thy voice in dreadful thunder speaks ;
And oft at dawn, deep noon or falling eve,
By brooks and groves, in hollow-whispering gales.
Thy bounty shines in Autumn unconfined,

And spreads a common feast for all that lives.
In Winter, awful Thou ! with clouds and storms,
Around Thee thrown, tempest o'er tempest rolled,
Majestic darkness ! on the whirlwind's wing,
Riding sublime. Thou bid'st the world adore,
And humblest Nature with Thy northern blast.

Mysterious round ! what skill, what force divine,
Deep felt, in these appear ! A simple train ;
Yet so delightful mixed, with such kind art,
Such beauty and beneficence combined ;
Shade, unperceived, so softening into shade ;
And all so forming an harmonious whole,
That, as they still succeed, they ravish still.
But, wandering oft, with brute unconscious gaze,
Man marks not Thee : marks not the mighty Hand,
That, ever busy, wheels the silent spheres :
Works in the secret deep ; shoots, steaming thence,
The fair profusion that o'erspreads the Spring ;
Flings from the sun direct the flaming day ;
Feeds every creature ; hurls the tempest forth ;
And, as on earth this grateful change revolves,
With transport touches all the springs of life.

Nature, attend ! Join every living soul ;
Beneath the spacious temple of the sky,
In adoration join ; and, ardent, raise
One general song ! To Him, ye vocal gales,
Breathe soft, Whose Spirit in your freshness breathes ;
Oh, talk of Him in solitary glooms !
Where, o'er the rocks the scarcely waving pine
Fills the brown shade with a religious awe.
And ye, whose bolder note is heard afar,
Who shake the astonished world, lift high to heaven
The impetuous song, and say, from Whom you rage,
His praise, ye brooks, attune ; ye trembling rills ;

And let me catch it as I muse along.
Ye headlong torrents, rapid, and profound ;
Ye softer floods, that lead the humid¹ maze
Along the vale ; and thou, majestic main,
A secret world of wonders in thyself,
Sound His stupendous praise ; Whose greater voice,
Or bids you roar, or bids your roarings fall.
Soft roll your incense, herbs, and fruits, and flowers,
In mingled clouds to Him ; Whose sun exalts,
Whose breath perfumes you, and Whose pencil paints.
Ye forests bend, ye harvests wave, to Him ;
Breathe your still song into the reaper's heart,
As home he goes beneath the joyous moon.
Ye that keep watch in heaven, as earth asleep
Unconscious lies, effuse² your mildest beams ;
Ye constellations, while your angels strike,
Amid the spangled sky, the silver lyre.
Great source of day ! best image here below
Of thy Creator, ever pouring wide,
From world to world, the vital ocean round,
On nature write, with every beam, His praise.
The thunder rolls : be hushed the prostrate world,
While cloud to cloud returns the solemn hymn !
Bleat out afresh, ye hills ; ye mossy rocks,
Retain the sound ! The broad responsive low,
Ye valleys, raise ; for the Great Shepherd reigns,
And His unsuffering kingdom yet will come !
Ye woodlands all, awake ! a boundless song
Burst from the grove ! and when the restless day,
Expiring, lays the warbling world asleep,
Sweetest of birds ! sweet Philomela,³ charm
The listening shades, and teach the night His praise.
Ye chief, for whom the whole creation smiles,
At once the head, the heart, the tongue of all,

Crown the great hymn ! In swarming cities vast,
Assembled men, to the great organ join
The long-resounding voice, oft breaking clear,
At solemn pauses, through the swelling bass ;
And, as each mingling flame increases, each
In one united ardour rise to heaven.

Or, if you rather choose the rural shade,
And find a fane in every sacred grove ;
There let the shepherd's flute, the virgin's lay,
The prompting seraph, and the poet's lyre
Still sing the God of Seasons, as they roll !
For me, when I forget the darling theme,
Whether the blossom blows, the Summer ray
Russets ⁴ the plain, inspiring Autumn gleams,
Or Winter rises in the blackening east,
Be my tongue mute ; may fancy paint no more ;
And, dead to joy, forget my heart to beat !

Should fate command me to the farthest verge
Of the green earth ; to distant barbarous climes ;
Rivers unknown to song, where first the sun
Gilds Indian mountains, or his setting beam
Flames on the Atlantic isles ; 'tis nought to me ;
Since God is ever present, ever felt,
In the void waste as in the city full :
And where He vital ⁵ breathes there must be joy.
When even, at last, the solemn hour shall come,
And wing my mystic ⁶ flight to future worlds,
I, cheerful, will obey ; there, with new powers,
Will rising wonders sing. I cannot go
Where Universal Love smiles not around,
Sustaining all yon orbs, and all their sons ;
From seeming evil still educing good,
And better thence again, and better still,
In infinite progression.—But I lose

Myself in Him, in Light Ineffable !
Come then, expressive silence, muse His praise !

THOMSON.

1. HUMID, damp or moist. (Lat. *humus*, the ground.)
2. EFFUSE, to shed, or pour out. (Lat. *fundo*, to pour.)
3. PHILOMELA, the nightingale.
4. RUSSETS THE PLAIN, *i.e.*, turns the plain brown.
5. WHERE HE VITAL BREATHES, *i.e.*, where the living God breathes.
6. MYSTIC, mysterious, secret.
7. INEFFABLE, inexpressible.

CAPTURE AND EXECUTION OF THE MARQUIS OF MONTROSE.

JAMES GRAHAM, Marquis of Montrose, was descended from the royal family of Scotland, and embraced with ardour the cause of Charles I.

He greatly distinguished himself during the long Civil War, and gained the battles of Perth, Aberdeen, and Inverlochy. But in 1645, being defeated by Lesley, he left the kingdom, and remained abroad until early in the year 1650, when, holding a commission from Charles II. to attempt a descent upon Scotland, he embarked at Hamburg with some arms and treasure supplied by the northern courts of Europe.

The fame of Montrose drew around him a few of the emigrant royalists, chiefly Scottish, and he recruited about six hundred German mercenaries.¹ His first descent was on the Orkney Islands, where he forced to arms a few hundred of unwarlike fishermen. He next disembarked on the mainland, and Strachan, an officer under Lesley, came upon him by surprise near a pass called Invercharron on the confines of Ross-shire. The Orkney men made but little resistance. The Germans

retired to a wood, and there surrendered ; the few Scottish companions of Montrose fought bravely, but in vain. Montrose, when the day was irretrievably lost, threw off his cloak bearing the star of the Order of the Garter, and afterwards changed clothes with an ordinary Highland kern,³ that he might endeavour to effect his escape, and swam across the river Kyle. Exhausted with fatigue and hunger, he was at length taken by a Ross-shire chief, MacLeod of Assint, who happened to be out with a party of his men in arms. The Marquis discovered himself to this man, thinking himself secure of favour, as Assint had been once his own follower. But, tempted by a reward of five hundred bolls of meal, this wretched chief delivered his old commander into the unfriendly hands of David Lesley.

The Covenanters, when he, who had so often made them tremble, was at length delivered into their hands, celebrated their victory with all the exultation of mean timid spirits suddenly released from the apprehension of imminent danger. Montrose was dragged in a sort of triumph from town to town, in the mean garb in which he had disguised himself for flight. To the honour of the town of Dundee, which had been partly plundered and partly burnt by Montrose's forces during his eventful progress in 1645, the citizens of that town were the first who supplied their fallen foe with clothes befitting his rank, with money and with necessaries.

Before Montrose reached Edinburgh, he had been condemned by the Parliament to the death of a traitor. The sentence was pronounced without further trial, upon an act of attainder passed while he was plundering Argyle in the winter of 1644, and it was studiously aggravated by every species of infamy.

The Marquis was, according to the special order of

Parliament, met at the gates by the magistrates, attended by the common hangman, who was clad for the time in his own livery. He was appointed, as the most infamous mode of execution, to be hanged on a gibbet thirty feet high, his head to be fixed on the Tolbooth, or prison of Edinburgh, his body to be quartered, and his limbs to be placed over the gates of the principal towns of Scotland. According to the sentence, he was conducted to jail in a cart, whereon was fixed a high bench on which he was placed, bound and bareheaded, the horse led by the executioner wearing his bonnet,⁸ and the noble prisoner exposed to the scorn of the people, who were expected to hoot and revile him. But the rabble, who came out with the rudest purposes, relented when they saw the dignity of his bearing, and silence, accompanied by the sighs and tears of the crowd, attended the progress, which his enemies had designed should excite other emotions.

He was next brought before the Parliament to hear the terms of his sentence. When it had been read he observed, that he was more honoured in having his head set on the prison for the cause in which he died, than he would have been, had they decreed a golden statue to be erected to him in the market-place, or in having his picture in the king's bedchamber. As to the distribution of his limbs, he said he wished he had flesh enough to send some to each city of Europe, in memory of the cause in which he died. He spent the night in reducing these ideas into poetry.

Early in the morning of the next day he was awakened by the drums and trumpets, calling out the guards by order of the Parliament to attend on his execution. "Alas," he said, "I have given these good folk much

trouble while alive, and do I continue to be a terror to them on the day I am to die?"

The clergy importuned him, urging repentance of his sins, and offering, on his expressing such compunction, to relieve him from the sentence of excommunication, under which he laboured. He calmly replied that though the excommunication had been rashly pronounced, yet it gave him pain, and he desired to be freed from it, if a relaxation could be obtained by expressing penitence for his offences as a man; but that he had committed none in his duty to his prince and country, and therefore had none to acknowledge or repent of.

Johnstone of Warriston, an eminent Covenanter, intruded himself on the noble prisoner, while he was combing the long curled hair, which he wore as a Cavalier. Warriston, a gloomy fanatic, hinted as if it were but an idle employment at so solemn a time. "I will arrange my head as I please to-day, while it is still my own," answered Montrose; "to-morrow it will be yours, and you may deal with it as you list."

The Marquis walked on foot from the prison to the Grassmarket, the common place of execution for the basest felons, where a gibbet of extraordinary height, with a scaffold covered with black cloth, was erected. Here he was again pressed by the Presbyterian clergy to own his guilt. Their cruel and illiberal officiousness could not disturb the serenity of his temper. To exaggerate the infamy of his punishment, or rather to show the mean spite of his enemies, a book containing the printed history of his exploits, was hung around his neck by the hangman. This insult, likewise, he treated with contempt, saying, he accounted such a record of his services to his prince, as a symbol equally honourable

with the badge of the Garter,⁴ which the king had bestowed on him.

In all other particulars, Montrose bore himself with the same calm dignity ; and finally submitted to execution with such resolved courage that many, even of his bitterest enemies, wept on the occasion. He suffered on the 21st of May 1650.

"Tales of a Grandfather," by SIR WALTER SCOTT.

1. **MERCENARIES**, soldiers hired into foreign service, and serving only for money, without caring in what cause. (Lat. *merces*, hire, reward.)

2. **KERN**, a peasant.

3. **BONNET**, a Highland cap.

4. **THE GARTER**, an order of knighthood established by Edward III.

BIOGRAPHICAL SKETCH OF GOLDSMITH.

OLIVER GOLDSMITH was born in 1730, and died in 1774. He studied for the medical profession, but finding that he made little progress, and that his poverty increased, he abandoned it, and going on the Continent, travelled through Holland, Switzerland, Germany, &c., on foot, generally dependent for subsistence on his skill as a flute-player ; during this journey he composed his poem, "The Traveller," from which our extract is taken.

SWITZERLAND.

TURN we to survey
Where rougher climes a nobler race display,
Where the bleak Swiss their stormy mansion tread,
And force a churlish soil for scanty bread :
No produce here the barren hills afford,
But man and steel, the soldier and his sword.

No vernal blooms their torpid ¹ rocks array,
But winter lingering, chills the lap of May ;
No zephyr fondly sues the mountain's breast,
But meteors' ² glare, and stormy glooms invest :
Yet still e'en here, content can spread a charm,
Redress the clime, and all its rage disarm.
Though poor the peasant's hut, his feasts though small,
He sees his little lot the lot of all ;
Sees no contiguous ³ palace rear its head,
To shame the meanness of his humble shed ;
No costly lord the sumptuous banquet deal
To make him loathe his vegetable meal ;
But calm, and bred in ignorance and toil,
Each wish contracting, fits him to the soil :
Cheerful at morn he wakes from short repose,
Breathes the keen air and carols as he goes ;
With patient angle trolls ⁴ the finny deep,
Or drives his venturous ploughshare to the steep ;
Or seeks the den where snow-tracks mark the way,
And drags the struggling savage ⁵ into day.
At night returning, every labour sped,
He sits him down, the monarch of a shed ;
Smiles by his cheerful fire, and round surveys
His children's looks that brighten at the blaze ;
While his loved partner, boastful of her hoard,
Displays her cleanly platter on the board ;
And haply too, some pilgrim, thither led,
With many a tale repays the nightly bed.
Thus every good his native wilds impart,
Imprints the patriot passion on his heart,
And e'en those ills that round his mansion rise,
Enhance ⁶ the bliss his scanty fund supplies.
Dear is that shed, to which his soul conforms,
And dear that hill which lifts him to the storms.

And, as a child, when scaring sounds molest,
 Clings close and closer to the mother's breast—
 So the loud torrent and the whirlwind's roar,
 But bind him to his native mountains more.

"*The Traveller*"—GOLDSMITH.

1. TORPID, sluggish: having lost the power of life. (Lat. *torpeo*, to be listless.)
2. METEORS, fiery bodies passing through the atmosphere.
3. CONTIGUOUS, bordering closely.
4. TROLL, to fish by letting the line trail behind a boat moving on the water.
5. SAVAGE, the word *beast* is here understood.
6. ENHANCE, to heighten: to add to.

THE BATTLE OF PRESTONPANS.¹

WHEN Fergus MacIvor and his friend, Edward Waverley, had slept for a few hours, they were awakened, and summoned to attend the Prince.² The distant village clock was heard to toll three, as they hastened to the place where he lay. He was already surrounded by his principal officers, and the chiefs of clans. A bundle of pease-straw, which had been lately his couch, now served for his seat. Just as Fergus reached the circle, the consultation had broken up.

"Courage, my brave friends!" said the Chevalier, "and each one put himself instantly at the head of his command. A faithful friend has offered to guide us by a practicable, though narrow and circuitous route, which, sweeping to our right, traverses the broken ground and morass, and enables us to gain the firm and open plain, upon which the enemy are lying. This difficulty surmounted, Heaven and your good swords must do the rest."

The proposal spread unanimous joy, and each leader hastened to get his men into order with as little noise as possible. The army, moving by its right from off the ground on which the men had rested, soon entered the path through the morass, conducting their march with astonishing silence and rapidity. The mist had not risen to the higher grounds, so that for some time they had the advantage of star-light. But this was lost, as the stars faded before approaching day, and the head of the marching column, continuing its descent, plunged as it were into the heavy ocean of fog, which rolled its white waves over the whole plain, and over the sea by which it was bounded. Some difficulties were now to be encountered, inseparable from darkness, a narrow, broken, and marshy path, and the necessity of preserving union in the march. These, however, were less inconvenient to Highlanders from their manner of life, than they would have been to any other troops, and they continued a steady and swift movement.

As the clan of Ivor approached the firm ground, following the track of those, who preceded them, the challenge of a patrol³ was heard through the mist, though they could not see the dragoon⁴ by whom it was made—"Who goes there?"

"Hush!" cried Fergus. "Hush! Let none answer, as he values his life. Press forward!" And they continued their march with silence and rapidity.

The patrol fired his carabine⁵ upon the body, and the report was instantly followed by the clang of his horse's feet, as he galloped off to give the alarm.

The clan of Fergus had now gained the firm plain, which had lately borne a large crop of corn. But the *harvest* was gathered in, and the expanse was unbroken by tree, bush, or interruption of any kind. The rest of

the army was following fast, when they heard the drums of the enemy beat the general call-to-arms. Surprise, however, had made no part of their plan, so they were not disconcerted by this intimation that the foe was upon his guard and prepared to receive them. It only hastened their dispositions for the combat, which were very simple.

The Highland army, which had occupied the eastern end of the wide plain, or stubble field, so often referred to, was drawn up in two lines, extending from the morass towards the sea. The first was destined to charge the enemy, the second to act as a reserve. The few horse, whom the Prince headed in person, remained between the two lines. The Adventurer⁶ had intimated a resolution to charge in person at the head of his first line; but his purpose was deprecated by all around him, and he was with difficulty induced to abandon it.

Both lines were now moving forward; the first prepared for instant combat. The clans of which it was composed, formed each a sort of separate phalanx,⁷ narrow in front, and in depth ten, twelve, or fifteen files, according to the strength of the following. The best-armed and best-born, for the words were synonymous,⁸ were placed in front of each of those irregular subdivisions. The others in the rear shouldered forward the front, and by their pressure, added both physical impulse and additional ardour and confidence, to those who were first to encounter the danger.

"Down with your plaid, Waverley," cried Fergus, throwing off his own; "we will win silks for our tartans, before the sun is above the sea."

The clansmen on every side stript their plaids, prepared their arms; and there was an awful pause of some three *minutes*, during which the men, pulling off their bonnets,

raised their faces to heaven, and uttered a short prayer; then pulled their bonnets over their brows, and began to move forward—at first slowly. Waverley felt his heart at that moment throb, as it would have burst from his bosom. It was not fear, it was not ardour,—it was a compound of both, a new and deeply energetic impulse, that with its first emotion chilled and astounded, then fevered and maddened his mind. The sounds around him combined to exalt his enthusiasm; the pipes played, and the clans rushed forward, each in its own dark column. As they advanced, they mended their pace, and the muttering sounds of the men to each other began to swell into a wild cry.

At this moment, the sun, which was now risen above the horizon, dispelled the mist. The vapour rose like a curtain, and showed the two armies in the act of closing. The line of the regulars was formed directly fronting the attack of the Highlanders; it glittered with the appointments of a complete army, and was flanked by cavalry and artillery. But the sight impressed no terror on the assailants.

“Forward, sons of Ivor,” cried their Chief, “or the Camerons will draw the first blood!”—They rushed on with a tremendous yell.

The rest is well known. The horse, who were commanded to attack the advancing Highlanders in the flank, received an irregular fire from their fuses, ⁹ as they ran on; and, seized with a disgraceful panic, wavered, halted, disbanded, and galloped from the field. The artillerymen, deserted by the cavalry, fled after discharging their pieces, and the Highlanders, who dropped their guns when fired, and drew their broadswords, rushed with *headlong* fury against the infantry.

It was at this moment of confusion and terror, that

Waverley remarked an English officer, apparently of high rank, standing alone and unsupported, by a field-piece, which, after the flight of the men by whom it had been served, he had himself levelled and discharged against the clan of MacIvor, the nearest group of Highlanders within his aim. Struck with his tall martial figure, and eager to save him from inevitable destruction, Waverley outstripped for an instant even the speediest of the warriors, and reaching the spot first, called upon him to surrender. The officer replied by a thrust with his sword, which Waverley received in his target, and in turning it aside the Englishman's weapon broke. At the same time the battle-axe of Dugald Mahony was in the act of descending upon the officer's head. Waverley intercepted and prevented the blow, and the officer perceiving farther resistance unavailing, and struck with Edward's generous anxiety for his safety, resigned the fragments of his sword, and was committed by Waverley to Dugald, with strict charge to use him well and not to pillage his person.

On Edward's right the battle for a few moments raged fierce and thick. The English infantry trained in the wars in Flanders, stood their ground with great courage. But their extended files were pierced, broken in many places by the close masses of the clans; and in the personal struggle which ensued, the nature of the Highlanders' weapons, and their extraordinary fierceness and activity gave them a decided superiority over those who had been accustomed to trust much to their array and discipline, and felt that the one was broken and the other useless.

Loud shouts of triumph soon echoed over the whole field. The battle was fought and won, and the whole *baggage, artillery, and military stores* of the regular

army remained in the possession of the Highlanders. Never was a victory more complete. Scarce any escaped from the field of battle, excepting the cavalry who had left it at the very first onset, and even these were broken into different parties and scattered all over the country.

"Waverley," by SIR WALTER SCOTT.

1. PRESTONPANS, a spot near Edinburgh where, in 1745, the English troops under Sir John Cope were completely defeated by the Highlanders under Prince Charles Edward.

2. THE PRINCE, Charles Edward Stuart, called also the Young Chevalier and the Young Pretender, grandson of King James II., and son of James Stuart, the Old Pretender.

3. PATROL, the guard which makes the patrol, or acts as sentry, going the rounds in a camp or garrison.

4. DRAGOON, a horse soldier, so called from having originally carried a musket on which was engraved the head of a dragon.

5. CARABINE, a short light musket, formerly used by the cavalry.

6. THE ADVENTURER, Prince Charles Edward.

7. PHALANX, a square battalion of heavy armed troops drawn up in ranks and files close and deep.

8. SYNONYMOUS, having the same meaning.

9. FUSEES, or fusils; light muskets or firelocks.

BIOGRAPHICAL SKETCH OF DR CHALMERS.

THE Rev. Thomas Chalmers, LL.D., Professor of Theology in the Free Church of Scotland, was born in Fifeshire, 1780, and died 1847.

He was one of the greatest preachers of his day, and his eloquence and enthusiasm roused the feelings of all who heard him. He was also an able and talented author, and wrote several important works.

PEACE AND WAR.

I FEAR that none of us have a lively enough conception¹ of the gratitude, that we ought to feel for the inestimable² blessing of Peace—that we live in the bosom of domestic tranquillity—that we have no midnight alarm to disturb us—no sound of horror to strike upon our ear and keep us awake and trembling in the agony of apprehension³—no moanings of wounded acquaintance—no shrieks of the dying to rend the heart of sensibility⁴—no hostile footsteps to warn us of the nearness of a brutal and enraged soldiery—no loud and stormy approaches to send anguish into the mother's heart, and make her weep in the wildness of despair, over the members of her shrinking and devoted family.

What a picture of horror is presented by the seat of war, when the marauding army of the conqueror is let loose upon the country—when the plunderers separate into parties, and each party singles out its own house, or its own neighbourhood, as the object of its brutality and vengeance. When every nerve is strained to deeds of barbarity—when pity is laughed at as a weakness, or its gentle whispers are drowned in the wild uproar of rapacity and desolation and murder.

What a contrast to the country, in which we live—a spectacle of peace in the midst of a wild and troubled theatre! What would not houseless victims give for the warmth and security of our dwellings! where every man lives under his own vine and his own fig-tree⁵—where he steps forth in the morning and prosecutes in safety the labours of the day—where he returns in the evening, and has his peaceful fireside enlivened by the smiling *aspect of his family* around him—where the Sabbath

morn still continues to bless the humble abode of the poor man and the labourer—where the church bell is still heard to waft its delightful music along our valleys, and to call an assembled people to the exercises of piety.

Let the piety of this day be gratitude to that Mighty Being who takes up the hills in His Hands, and weighs the nations in a balance. He has thrown around our happy country the shelter of a protecting ocean. He has mustered His own elements to defend us. The Green Island of the North⁶ sits in the bosom of security—it hears the sound of the battle from afar, but quietness dwells there, and peace and joy are among its children. Look at the extent of Britain, and it is a speck upon the surface of the world. Look at the map, and it appears like an appendage⁷ to that immense continent, that is in arms against it. Yet how high it stands in the proud lists of glory—how great in the independence of its empire—how awful in the thunder of its power, that is heard in the remotest corners of the world—how firm in the patriotism and intrepidity of its people, who rally round the standard of their liberties, and maintain the name and dignity of their nation against the fury of a devouring ambition.⁸

CHALMERS.

1. CONCEPTION, the power of comprehending and understanding.
2. INESTIMABLE, priceless ; not to be estimated or valued.
3. APPREHENSION, fear.
4. SENSIBILITY, acute feeling.
5. HIS OWN VINE AND HIS OWN FIG-TREE. This is a reference to the promises of rest and ease so repeatedly given to the Israelites. "They shall sit every man under his vine and under his fig-tree ; and none shall make them afraid" (Mic. iv. 4. ; also 1 Thess. iv. 25).
6. THE GREEN ISLAND OF THE NORTH, Great Britain ; famed among other things for the freshness of its foliage and the greenness of its turf.

1. APPENDAGES, that which is subordinate ; or hung on to something else. (Lat. *pendeo*, to hang.)

2. AMBITION, the ambition here referred to is of Napoleon I., Emperor of France, who at this period threatened the invasion of Ireland.

THE CHASE.

THE noble stag was pausing now
 Upon the mountain's southern brow,
 Where broad extended, far beneath,
 The varied realms of fair Menteith.¹
 With anxious eye he wandered o'er
 Mountain and meadow, moss and moor.
 And pondered refuge from his toil
 By far Lochard,² or Aberfoyle.
 But nearer was the copse-wood grey,
 That waved and wept on Loch Achray,³
 And mingled with the pine-trees blue
 On the bald cliffs of Benvenue.
 Fresh vigour with the hope returned,
 With flying foot the heath he spurned,
 Held westward with unwearied race,
 And left behind the panting chase.

'Twere long to tell what steeds gave o'er,
 As swept the hunt through Cambusmore :
 What reins were tightened in despair,
 When rose Benledi's ridge in air ;
 Who flagged upon Bochastle's heath,
 Who shunned to stem the flooded Teith ;
 For twice, that day, from shore to shore,
 The gallant stag swam stoutly o'er.
 Few were the stragglers, following far,
 That reached the Lake of Vennachar :

And when the Brigg³ of Turk was won,
The headmost horseman rode alone.

Alone, but with unbated⁴ zeal,
That horseman plied both scourge and steel ;
For, jaded now, and spent with toil,
Embossed with foam, and dark with soil,
While every gasp with sobs he drew,
The labouring stag strained full in view.
Two dogs of black Saint Hubert's⁵ breed,
Unmatched for courage, breath, and speed,
Fast on his flying traces came,
And all but won that desperate game ;
For, scarce a spear's length from his haunch,
Vindictive toiled the blood-hounds staunch :
Nor nearer might the dogs attain,
Nor farther might the quarry⁶ strain.
Thus up the margin of the lake,
Between the precipice and brake,
O'er stock and rock their race they take.

The hunter marked that mountain high,
The lone lake's western boundary,
And deemed the stag must turn to bay,
Where that rude rampart barred the way ;
Already glorying in the prize,
Measured his antlers with his eyes ;
For the death-wound, and death halloo,
Mustered his breath, his whinyard⁷ drew :
But, thundering as he came prepared,
With ready aim and weapon bared,
The wily quarry shunned the shock,
And turned him from the opposing rock ;
Then, dashing down a darksome glen,
Soon lost to hound and hunter's ken,

In the deep Trosachs ⁸ wildest nook,
 His solitary refuge took.
 There, while close couched, the thicket shed
 Cold dews and wild-flowers on his head.
 He heard the baffled dogs in vain
 Race through the hollow pass amain,
 Chiding the rocks that yelled again.

Close on the hounds the hunter came,
 To cheer them on the vanished game :
 But, stumbling in the rugged dell,
 The gallant horse exhausted fell.
 The impatient rider strove in vain
 To rouse him with the spur and rein ;
 For the good steed, his labours o'er,
 Stretched his stiff limbs, to rise no more.
 Then touched with pity and remorse,
 He sorrowed o'er the expiring horse.
 " I little thought, when first thy rein
 I slacked upon the banks of Seine, ⁹
 That Highland eagle e'er should feed
 On thy fleet limbs, my matchless steed !
 Woe worth the chase, woe worth the day,
 That cost thy life, my gallant gray !"
" Lady of the Lake," by SIR WALTER SCOTT.

- . MENTEITH, a district in the Highlands, south of Perthshire.
- . LOCHARD, &c., lakes in the Highlands. BENVENUE is a mountain of Perthshire, in which neighbourhood all the other places mentioned in this poem may be found.
- . BRIGG, or brig ; Scotch for bridge.
- . UNBATED, or unabated ; not lessened.
- . TWO DOGS, &c. St Hubert was the patron saint of hunting, the dogs named after him were of the bloodhound species.
- . QUARRY, the object of the chase.
- . WHINYARD, or whinger, a small sword or hunting-knife.

8. **TRoSACHS**, a famous tract in the Highlands, between Lochs Katrine and Achray, south of Perthshire.

9. **SEINE**, a river in France which rises in the north of Côte d'Or and falls into the English Channel.

BIOGRAPHICAL SKETCH OF THE REV. SYDNEY SMITH.

THE Rev. Sydney Smith was born at Woodford, in Essex, in 1771, and died in 1841.

He was an English clergyman, and author of some note.

He was one of the chief contributors to the *Edinburgh Review*, and he also published several original works, the best known of which is entitled, "Letters to my Brother Andrew from Peter Plymly."

Sydney Smith's style was brilliant, full of humour and satire, his wit was keen, and few follies or vanities escaped him.

DISTINCTION.

IT is natural to every man to wish for distinction; and the praise of those, who can confer honour by their praise, is sweet to every human heart; but as eminence can be but the lot of a few, patience of obscurity is a duty, which we owe not more to our own happiness, than to the quiet of the world at large.

Give freedom, if you are young and ambitious, to that spirit, which thinks within you; measure yourself with your equals; and learn, from frequent competition, the place, which nature has allotted to you; make of it no mean battle, but strive hard; strengthen your soul to the search of truth, and follow the vision of excellence which beckons you on beyond the walls of the world to something better than man has yet done.

It may be, that you shall burst out into light and glory

at the last ; but if frequent failure convince you of the mediocrity¹ of nature, which is incompatible² with great actions, submit wisely and cheerfully to your lot ; let no mean spirit of revenge tempt you to throw off your loyalty to your country, and to prefer a vicious celebrity to obscurity crowned with piety and virtue.

If you can throw light upon moral truth, or by any exertions multiply the comforts or confirm the happiness of mankind, this fame guides you to the true ends of your nature ; but in the name of God, as you tremble at retributive justice, and in the name of mankind, if mankind be dear to you, seek not the easy and accursed fame which is gathered in the work of revolutions ; and deem it better to be for ever unknown, than to found a momentary name on the basis³ of anarchy⁴ and irreligion.

SIDNEY SMITH.

1. **MEDIOCRITY**, a middle state, neither very good nor very bad. (Lat. *medius*, middle.)

2. **INCOMPATIBLE**, not consistent with.

3. **BASIS**, the foundation, that on which a thing rests.

4. **ANARCHY**, without government ; state of political confusion.

BIOGRAPHICAL SKETCH OF LORD MACAULAY.

THOMAS BABINGTON, Lord Macaulay, was born at Rothley Temple, Leicestershire, in the year 1800, and died in 1859.

He is celebrated alike as an historian, orator, essayist, and poet.

His father, Zachary Macaulay, was an earnest philanthropist, and aided Wilberforce¹ and others in their efforts to obtain the abolition of slavery ; his mother was a pupil of the celebrated *Hannah More*.² In early youth, the boy showed signs of genius,

and of a power of memory, which astonished all who knew him.

His first literary production was an essay on Milton, which appeared in 1826, and drew upon him the attention of the public ; this was followed by many other essays, critical and historical, of which the one on Warren Hastings (from which our extract is taken), is perhaps one of the most striking. Macaulay wrote some poems of great merit, "The Lays of Ancient Rome," "The Armada," &c., also a "History of England, from the Accession of James II."

In 1830, he entered Parliament, and soon afterwards received a government appointment ; he was an eloquent but not a frequent speaker, and in 1857 he was raised to the peerage as Baron Macaulay.

THE TRIAL OF WARREN HASTINGS.

WARREN HASTINGS, born 1733, died 1818, was the first Governor-General of India. He was a man of great energy and talents, and succeeded in consolidating and strengthening our Eastern Empire ; but he was accused of injustice and cruelty to the native princes, and on his return to England, in 1785, he was impeached * before the House of Lords, by official accusers appointed by the House of Commons. His trial lasted seven years, and ended in his acquittal.

The commencement of this famous trial is thus described by Lord Macaulay :—

"The preparations for the trial had proceeded rapidly; and on Feb. 13th, 1788, the sittings of the court commenced. There have been spectacles more dazzling to the eye, more gorgeous with jewellery and cloth of gold, more attractive to grown-up children, than that which was then exhibited at Westminster ; but, perhaps, *there never was a spectacle so well calculated to strike a highly-cultivated, a reflecting, an imaginative mind.*

All the various kinds of interests, which belong to the near and to the distant, to the present and to the past, were collected on one spot and in one hour. All the talents and all the accomplishments, which are developed by liberty and civilisation were now displayed, with every advantage, that could be derived both from co-operation and from contrast. Every step in the proceedings carried the mind either backward, through many troubled centuries, to the days when the foundations of our constitution were laid ; or far away, over boundless seas and deserts, to dusky nations living under strange stars, worshipping strange gods, and writing strange characters from right to left. The High Court of Parliament was to sit, according to forms handed down from the days of the Plantagenets, on an Englishman accused of exercising tyranny over the Lord of the Holy City of Benares,⁴ and over the ladies of the princely house of Oude.⁵

"The place was worthy of such a trial. It was the great Hall of William Rufus, the hall which had resounded with acclamations at the inauguration⁶ of thirty kings, the hall which had witnessed the just sentence of Bacon,⁷ and the just absolution of Somers,⁸ the hall where the eloquence of Strafford⁹ had for a time awed and melted a victorious party inflamed with just resentment, the hall where Charles I. had confronted the High Court of Justice, with the placid courage which has half redeemed his fame.

"Neither military nor civil pomp was wanting. The avenues were lined with grenadiers. The streets were kept clear by cavalry. The peers, robed in gold and ermine, were marshalled by the heralds under Garter King-at-Arms.¹⁰ The judges, in their vestments of state, attended to give advice on points of law. Near a hundred and seventy lords, three-fourths of the Upper

House, as the Upper House then was, walked in solemn order from their usual place of assembling to the tribunal. The junior baron present led the way, George Eliott, Lord Heathfield, recently ennobled for his memorable defence of Gibraltar, against the fleets and armies of France and Spain. The long procession was closed by the Duke of Norfolk, Earl Marshal of the realm, by the great dignitaries, and by the brothers and sons of the king. Last of all came the Prince of Wales, conspicuous by his fine person and noble bearing.

"The grey old walls were hung with scarlet. The long galleries were crowded by an audience, such as has rarely excited the fears or the emulation of an orator. There were gathered together, from all parts of a great, free, prosperous, and enlightened empire, grace and female loveliness, wit and learning, the representatives of every science and of every art.

"The sergeants¹¹ made proclamation. Hastings advanced to the bar and bent the knee. The culprit was, indeed, not unworthy of that great presence. He had ruled an extensive and populous country, had made laws and treaties, had sent forth armies, had set up and pulled down princes. And in his high place had so borne himself, that all had feared him, that most had loved him, and that hatred itself could deny him no title to glory except virtue. He looked like a great man, and not like a bad man. A person small and emaciated,¹² yet deriving dignity from a carriage, which, while it indicated deference to the court, indicated also habitual self-possession and self-respect, a high and intellectual forehead, a brow pensive but not gloomy, a mouth of inflexible decision, a face pale, worn, but serene; such *was* the aspect with which the great proconsul¹³ presented himself to his judges.

“ His counsel accompanied him, men, all of whom were afterwards raised, by their talents and learning, to the highest posts in their profession ; the bold and strong-minded Law, afterwards Chief Justice of the King's Bench ; the more humane and eloquent Dallas, afterwards Chief Justice of the Common Pleas ; and Palmer who, twenty years later, successfully conducted in the same high court the defence of Lord Melville, and subsequently became Vice-Chancellor, and Master of the Rolls.

“ But neither the culprit nor his advocates attracted so much attention as the accusers. In the midst of the blaze of red drapery, a space had been fitted up with green benches and tables for the Commons. The managers,¹⁴ with Burke¹⁵ at their head, appeared in full dress, and the box, in which the managers stood, contained an array of speakers, such as perhaps had not appeared together since the great age of Athenian eloquence.

“ There were Fox and Sheridan, the English Demosthenes,¹⁶ and the English Hyperides.¹⁷ There was Burke, ignorant indeed, or negligent, of the art of adapting his reasonings and his style to the capacity and taste of his hearers, but in amplitude of comprehension and richness of imagination, superior to every orator, ancient or modern. There, with eyes reverentially fixed on Burke, appeared the finest gentleman of the age, his form developed by every manly exercise, his face beaming with intelligence and spirit, the ingenious, the chivalrous, the high-souled Windham.

“ Nor though surrounded by such men, did the youngest manager pass unnoticed. At an age when most of those, who distinguish themselves in life, are still contending for prizes and fellowships at college, he had won for *himself* a conspicuous place in Parliament. No

advantages of fortune or connection were wanting, that could set off to the height his splendid talents, and his unblemished honour. At twenty-three, he had been thought worthy to be ranked with the veteran statesmen, who appeared as the delegates of the British Commons, at the bar of the British nobility. All who stood at that bar, save him alone, are gone ; culprit, advocates, accusers. To the generation, which is now in the vigour of life, he is the sole representative of a great age, which has passed away. But those who have listened with delight, till the morning sun shone on the tapestries of the House of Lords, to the lofty and animated eloquence of Charles, Earl Grey,¹⁸ are able to form some estimate of the powers of a race of men, among whom he was not the foremost.

"The charges and the answers of Hastings were first read. The ceremony occupied two whole days, and was rendered less tedious, than it would otherwise have been, by the silver voice and just emphasis of Cowper, the clerk of the court, a near relation of the amiable poet.¹⁹

"On the third day Burke rose. Four sittings were occupied by his opening speech, which was intended to be a general introduction to all the charges. With an exuberance of thought, and a splendour of diction, which more than satisfied the highly-raised expectation of the audience, he described the character and institutions of the natives of India, recounted the circumstances, in which the Asiatic Empire of Great Britain had originated, and set forth the constitution of the Company²⁰ and of the English Presidencies.²¹

"Having thus attempted to communicate to his hearers an idea of Eastern society, as vivid as that which existed in his own mind, he proceeded to arraign the administration of Hastings as systematically conducted in defiance of morality and public law.

"The energy and pathos of the great orator extorted expressions of unwonted admiration from the stern and hostile chancellor,²² and for a moment seemed to pierce even the resolute heart of the defendant. The ladies in the galleries, unaccustomed to such displays of eloquence, excited by the solemnity of the occasion, and perhaps not unwilling to display their taste and sensibility, were in a state of uncontrollable emotion. Handkerchiefs were pulled out; smelling bottles were handed round; hysterical sobs and screams were heard; and Mrs Sheridan was carried out in a fit.

"At length the orator concluded. Raising his voice till the old arches of Irish oak resounded. 'Therefore, said he, 'hath it with all confidence been ordered by the Commons of Great Britain, that I impeach Warren Hastings of high crimes and misdemeanours. I impeach him in the name of the Commons' House of Parliament, whose confidence he has betrayed. I impeach him in the name of the English nation, whose ancient honour he has sullied. I impeach him in the name of the people of India, whose rights he has trodden under foot, and whose country he has turned into a desert. Lastly, in the name of human nature itself, in the name of both sexes, in the name of every age, in the name of every rank, I impeach the common enemy and oppressor of all.' "

LORD MACAULAY.

1. WILBERFORCE, William, a noted English philanthropist, born at Hull, 1759, died 1833. He was devoted heart and soul to the task of suppressing the cruel and infamous slave-trade, and his efforts were at last successful. He died just as the bill for the Abolition of Slavery was passing through the House of Commons.

2. HANNAH MORE, an eminent moral writer, born 1744, died 1833.

3. IMPEACH, to cite before a court for official misconduct.

4. BENARES, a city on the Ganges, in Hindostan. The Sacred or Holy City of the Hindoos.

5. **ODDE**, a province in the north of India.
 6. **INAUGURATION**, commencement.
 7. **BACON**, Francis, Lord Bacon, born 1561, died 1626. An illustrious philosopher and statesman. James I. raised him to high honours, and finally created him Lord Chancellor in 1618. Bacon misused his high office, and was accused by the Commons of accepting bribes, and selling offices in his gift.
 8. **SOMERS**, John, Lord Somers, born 1650, died 1716. In 1695 he was made Lord Chancellor; he was afterwards deprived of the seals of office, but was finally restored to his honours, and made President of the Council.
 9. **STRAFFORD**, Thomas Wentworth, Earl of Strafford, born 1593, died 1641. An English statesman who lived in the reign of Charles I. He was first opposed to the king's exactions, but afterwards became Charles's friend and faithful servant. Strafford was impeached and condemned to death by the Parliament; and the king, fearing for his own safety, signed the warrant; an act which he ever afterwards regretted.
 10. **GARTER KING-AT-ARMS**, the principal herald of the Order of the Garter.
 11. **SERGEANTS**, these were the *sergeants-at-arms*, officers whose duty it is to keep order, &c., in high legislative courts.
 12. **EMACIATED**, thin; wasted.
 13. **PROCONSUL**, the governor of a province, originally; a Roman officer who acted instead of a Consul. (Lat. *pro*, instead of, *consul*, chief magistrate.)
 14. **THE MANAGERS**, the gentlemen appointed by the House of Commons to conduct the impeachment.
 15. **BURKE**, a famous orator and statesman, born in Dublin, 1730, died 1797.
 16. **DEMOSTHENES**, one of the greatest orators of ancient Greece, born at Athens, B.C. 384, died 322.
 17. **HYPERIDES**, another celebrated Greek orator, and a friend of Demosthenes.
 18. **EARL GREY**, father of the present earl. The statesman referred to in the text was born 1764, and died 1845.
 19. **POET**, for sketch of the poet Cowper, see Fifth Book, p. 114.
 20. **THE COMPANY**, the East India Company; originally, a trading company, which in 1708 obtained a charter giving them the chief governing and political power in India. This political power was transferred to the Crown in 1858.
 21. **PRESIDENCIES**, the three great provinces of India—Bengal, Bombay, and Madras.
 22. **CHANCELLOR**, Lord Thurlow, a political enemy and opponent of Hastings.
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BIOGRAPHICAL SKETCH OF HUGH MILLER.

HUGH MILLER was born in the little town of Cromarty, in the North of Scotland, in the year 1802, and he died in 1856.

His father, the master and owner of a small ship, was lost at sea during a terrible storm in 1807, and Hugh and his two little sisters became entirely dependent on the exertions of their widowed mother. Under these circumstances the boy received but little regular education, yet such was his love of knowledge, that he diligently read and studied every book that fell in his way ; thus he acquired a considerable knowledge of history, and of many of the natural sciences, especially geology ;¹ to this latter study he devoted every spare moment, and all the energy and industry of his nature ; and became in the course of time one of our most distinguished geologists.

During fifteen years of his life he worked as a journeyman stone-mason ; choosing that employment, because it gave him leisure during the winter months to pursue his beloved science. At the end of that time he received an honourable appointment in a bank in his native town, where he added to his small salary by his literary and scientific labours.

His numerous books have been widely read and appreciated ; from one of the best known of them, "The Old Red Sandstone," we have taken the following account of Hugh Miller's first day of labour in a stone quarry.²

MY FIRST DAY IN A STONE QUARRY.

It was twenty years, last February, since I set out, a little before sunrise, to make my acquaintance with a life of labour and restraint ; and I have rarely had a heavier heart than on that morning. I was but a slim, loose-jointed boy at the time, fond of the pretty intangibilities of romance, and of dreaming when broad awake ; and, woful change ! I was now going to work at one of the most disagreeable of all employments,—to work in a quarry.

Bating the passing uneasiness occasioned by a few gloomy anticipations, the portion of my life which had already gone by had been happy beyond the common lot. I had been a wanderer among rocks and woods, a reader of curious books, when I could get them, a gleaner of old traditionary stories; and now I was going to exchange all my day-dreams, and all my amusements, for the kind of life, in which men toil every day, that they may be enabled to eat, and eat every day, that they may be enabled to toil.

The quarry, in which I wrought, lay on the southern shore of a noble inland bay, or firth, with a little clear stream on one side, and a thick fir wood on the other. It had been opened in the Old Red Sandstone of the district, and was overtopped by a huge bank of diluvial³ clay, which rose over it in some places to the height of nearly thirty feet, and which at this time was rent and shivered, wherever it presented an open front to the weather, by a recent frost.

A heap of loose fragments, which had fallen from above, blocked up the face of the quarry, and my first employment was to clear them away. The friction of the shovel soon blistered my hands, but the pain was by no means very severe, and I wrought hard and willingly, that I might see how the huge strata⁴ below, which presented so firm and unbroken a frontage, were broken up and removed.

Picks, and wedges, and levers, were applied by my fellow-workmen; and simple and rude as I had been accustomed to regard these implements, I found I had much to learn in the way of using them. They all proved insufficient, however, and the workmen had to bore into one of the inferior strata, and employ gunpowder. The *process* was new to me, and I deemed it a highly amus-

ing one : it had the merit, too, of being attended with some such degree of danger as a boating or rock excursion, and had thus an interest independent of its novelty.

The fragments flew in every direction ; and an immense mass of the diluvium came toppling down, bearing with it two dead birds, that in a recent storm had crept into one of the deeper fissures, to die in the shelter. I felt a deep interest in examining them. The one was a pretty cock goldfinch, with its hood of vermillion,⁵ and its wings inlaid with the golden tint, to which it owes its name, as unsoiled and smooth, as if it had been preserved in a museum. The other, a somewhat rarer bird, of the woodpecker tribe, was variegated with light blue and a greyish yellow.

I was engaged in admiring the poor little things, and thinking of the contrast between the warmth and jollity of their green summer haunts, and the cold and darkness of their last retreat, when I heard our employer bidding the workmen lay by their tools.

I looked up, and saw the sun sinking behind the fir wood beside us, and the long shadow of the trees stretching downwards toward the shore.

This was no very formidable beginning of the course of life I had so much dreaded. To be sure my hands were a little sore, and I felt nearly as much fatigued, as if I had been climbing among the rocks ; but I had wrought and been useful, and had yet enjoyed the day fully as much as usual.

My first year of labour came to a close, and I found, that the amount of my happiness had not been less than in the last of my boyhood. My knowledge, too, had increased in more than the ratio⁶ of former seasons ; and as I had acquired the skill of, at least, the common mechanic, I had *fitted myself* for independence ; and the

experience of twenty additional years has not shown me, that there is any necessary connection between a life of toil and a life of wretchedness, but it has rather taught me how possible it is to enjoy much happiness in very mean employments.

"The Old Red Sandstone," by HUGH MILLER.

1. GEOLOGY, the science which treats of the materials of which the crust of the earth is composed, and of the manner in which they are arranged.

2. QUARRY, a place where stones are hewn for building and other purposes.

3. DILUVIAL, a deposit of sand, gravel, &c., overlying other and older deposits.

4. STRATA, plural of stratum, a bed or layer spread out.

5. VERMILION, a bright red colour.

6. RATIO, the relation of one thing to another.

BIOGRAPHICAL SKETCH OF LORD BYRON.

GEORGE GORDON, Lord Byron, was born at Dover in 1788, and died at Missolonghi, in Greece, in the year 1824.

Lord Byron inherited his title from his mother, with whom he spent the first years of his life; his father, Captain Byron, having died when the future poet was only three years old. He was afterwards educated at Harrow and Cambridge.

In some respects Lord Byron is one of the greatest of our English poets. The musical rhythm¹ of his verse is unsurpassed; but unfortunately, in many of his poems, he has striven to make crime attractive, and vice appear like virtue.

The most justly praised of his numerous works is the "Pilgrimage of Childe Harold," in which, under an assumed name, he describes his impressions of Italy and other foreign countries. The force and delicacy of these descriptions may be judged from the following extract.

1. RHYTHM, the regular recurrence of accented syllables, which gives to poetry its harmonious flow.

THE RUINS OF THE COLISEUM.¹

ARCHES on arches ! as it were that Rome,
Collecting the chief trophies ² of her line,
Would build up all her triumphs in one dome,
Her Coliseum stands ; the moonbeams shine
As 'twere its natural torches, for divine
Should be the light which streams here, to illumine
This long explored but still exhaustless mine
Of contemplation ; and the azure gloom
Of an Italian night, where the deep skies assume
Hues which have words, and speak to ye of heaven,
Floats o'er this vast and wondrous monument,
And shadows forth its glory. There is given
Unto the things of the earth, which Time hath bent,
A spirit's feeling ; and where he hath leant
His hand, but broke his scythe, there is a power
And magic in this ruined battlement,
For which the palace of the present hour
Must yield its pomp, and wait till ages are its dower.

A ruin—yet what a ruin ! from its mass,
Walls, palaces, half cities, have been reared ;
Yet oft the enormous skeleton ye pass,
And marvel where the spoil could have appeared.
Hath it indeed been plundered, or but cleared ?
Alas ! developed, opens the decay,
When the colossal fabric's form is neared ;
It will not bear the brightness of the day
Which streams too much on all years, man, have reft
away.

But when the rising moon begins to climb
Its topmost arch, and gently pauses there ;

When the stars twinkle through the loops of time,
 And the low night-breeze waves along the air,
 The garland-forest, which the gray walls wear,
 Like laurels on the bald first Cæsar's ⁴ head ;
 When the light shines serene, but doth not glare,
 Then in this magic circle raise the dead :
 Heroes have trod this spot—'tis on their dust ye tread.

BYRON.

1. COLISEUM, the amphitheatre at Rome, erected by the Emperor Vespasian. At the time of its erection this was the largest building of the kind in the world ; hence the name signifying gigantic.

2. TROPHIES, things taken from an enemy, and preserved as memorials of victory.

3. COLOSSAL, gigantic. The word is derived from the *Colossus*, a gigantic statue of Apollo, which stood at the entrance of the harbour of Rhodes.

4. FIRST CÆSAR, Julius Cæsar, he twice invaded Britain.

ADDRESS TO THE OCEAN.

THERE is a pleasure in the pathless woods,
 There is a rapture on the lonely shore,
 There is society where none intrudes,
 By the deep sea, and music in its roar :
 I love not man the less, but nature more,
 From these our interviews, in which I steal
 From all I may be, or have been before,
 To mingle with the universe, and feel
 What I can ne'er express, yet cannot all conceal.

Roll on, thou deep and dark blue ocean—roll !
 Ten thousand fleets sweep over thee in vain,
 Man marks the earth with ruin—his control
 Stops with the shore ;—upon the watery plain
 The wrecks are all thy deed, nor doth remain
 A shadow of man's ravage, save his own,

When for a moment, like a drop of rain,
He sinks into thy depths with bubbling groan,
Without a grave, unknelled, uncoffined, and unknown.

The armaments¹ which thunderstrike the walls
Of rock-built cities, bidding nations quake
And monarchs tremble in their capitals,
The oak leviathans,² whose huge ribs make
Their clay creator the vain title take
Of lord of thee, and arbiter of war ;
These are thy toys, and, as the snowy flake,
They melt into thy yeast of waves, which mar
Alike the Armada's³ pride or spoils of Trafalgar.⁴

Thy shores are empires, changed in all save thee—
Assyria,⁵ Greece,⁶ Rome,⁷ Carthage,⁸ what are they ?
Thy waters wasted them while they were free,
And many a tyrant since ; their shores obey
The stranger, slave, or savage ; their decay
Has dried up realms to deserts :—not so thou,
Unchangeable save to thy wild waves' play—
Time writes no wrinkle on thine azure brow—
Such as creation's dawn beheld, thou rollest now.

Thou glorious mirror, where the Almighty's form
Glasses itself in tempests ; in all time,
Calm or convulsed—in breeze, or gale, or storm,
Icing the pole, or in the torrid clime⁹
Dark, heaving—boundless, endless, and sublime—
The image of Eternity—the throne
Of the Invisible ; even from thy slime
The monsters of the deep are made ; each zone
Obeys thee ; thou goest forth, dread, fathomless, alone.

And I have loved thee, Ocean ! and my joy
Of youthful sports was on thy breast to be

Borne, like thy bubbles, onward : from a boy
 I wantoned with thy breakers—they to me
 Were a delight ; and if the freshening sea
 Made them a terror—'twas a pleasing fear,
 For I was as it were a child of thee,
 And trusted to thy billows far and near,
 And laid my hand upon thy mane—as I do here.

BYRON.

1. **ARMAMENTS**, the guns, &c., with which ships are armed for war ; also land forces armed and equipped.

2. **OAK LEVIATHANS**, large wooden ships. The *Leviathan* is a large aquatic animal referred to in the Book of Job and other parts of the Bible, supposed to be a whale or crocodile ; the word is now applied to anything of great size.

3. **ARMADA**, a fleet of armed ships ; the term is especially applied to the fleet sent by Philip II. of Spain against Queen Elizabeth in 1588, A.D., which was partly destroyed by a tempest before it encountered the English fleet.

4. **TRAFALGAR**, see page 74.

5. **ASSYRIA**, the first of the great empires of old, situated west of Asia ; capital, Nineveh. The capital and great part of the empire are now waste and ruined, and covered with sand.

6. **GREECE**, the third of the great empires of old, situated at the south of Europe.

7. **ROME**, the fourth great empire ; it extended over the whole of south and south-west of Europe, and part of Africa and Asia ; capital, Rome on the Tiber.

8. **CARTHAGE**, a powerful state north of Africa, long the rival of Rome. The modern town of Tunis stands on or near the ruins of the ancient Carthage.

9. **TORRID CLIME**, the torrid zone or tropics, extending $23\frac{1}{2}^{\circ}$ north, and $23\frac{1}{2}^{\circ}$ south of the Equator ; and is consequently the hottest part of the earth. (Lat. *torreo*, to burn.)

DUTCH EXPEDITIONS TO THE NORTHERN REGIONS.

PART I.

In the year 1595, the States-General offered a reward of twenty-five thousand florins to any navigators, who

might succeed in discovering a northern passage to India, with a proportionate sum to those, whose efforts in that direction might be deemed commendable, even if not crowned with success.

Stimulated by the spirit of adventure and the love of science, far more than by the hope of gaining a pecuniary prize, the undaunted Barendz, who was firm in the faith, that a pathway existed by the north of Nova Zembla, and across the pole to farthest India, determined to renew his attempt the following summer. He had already commanded two expeditions to the Arctic Seas, in 1594 and 1595. The city of Amsterdam, accordingly, early in the year 1596, fitted out two ships. Select crews, entirely of unmarried men, volunteered for the enterprise. John Cornelius Van der Rip, an experienced captain, was placed in charge of one of the vessels; Barendz was upper pilot of the other, and the famous Heemskirk was skipper and supercargo. The ships sailed from the Vlie on the 18th of May.

On the 5th of June, the watch upon deck saw, as they supposed, immense flocks of white swans, swimming towards the ships, and covering the sea, as far as the eye could reach. All hands came up to look at the amazing spectacle, but the more experienced soon perceived, that the myriads of swans were simply infinite fields of ice, through which, however, they were able to steer their course without much impediment, getting into clear sea beyond, about midnight, at which hour the sun was still above the horizon.

Proceeding northwards two days more, they were again surrounded with ice, and finding the "water green as grass" they believed themselves to be near Greenland. On the 9th of June they discovered an island, in latitude about $74^{\circ} 30'$ N., which seemed nearly

five miles long. In this neighbourhood they remained four days, having on one occasion a great fight with a polar bear, and making a desperate effort to capture him in order to bring him as a show to Holland. The effort not being successful, they were obliged to take his life to save their own ; but in what manner they intended, had they secured him alive, to provide for such a passenger in the long voyage across the North Pole to China and thence back to Amsterdam, did not appear. The attempt illustrates the calmness, however, of these hardy navigators.

Six days later they saw land again, and found their latitude to be $80^{\circ} 11''$ N. Certainly no men had ever been within ten degrees of the pole before. On the longest day of the year they landed on this newly discovered country, which they at first fancied to be part of Greenland. They found its surface covered with eternal snow, broken into mighty glaciers,¹ jagged with precipitous ice-peaks, and to this land of almost perpetual winter, where the mercury freezes during ten months of the year, and the sun remains four months beneath the horizon, they subsequently gave the appropriate name of Spitzbergen.² Combats with the sole denizens³ of these hideous abodes, the polar bears, on the floating ice, on the water, or on land, were constantly occurring, and were the only events to disturb the monotony⁴ of that perpetual icy sunshine, where no night came to relieve the almost maddening glare. They rowed up a wide inlet on the western coast, and came upon great numbers of wild geese, sitting on their eggs. They proved to be the same geese that were in the habit of visiting Holland in vast flocks every summer, and it had never before been discovered where they laid and hatched their eggs.

Early in July, Cornelius Rip parted company with Heemskirk and Barendz, having announced his intention to sail northward again beyond Lat. 80°, in search of the coveted passage. Barendz, retaining his opinion, that the true inlet to the circumpolar sea, if it existed, would be found north-east of Nova Zembla,⁵ sailed in that direction.

On the 20th of July the ice obstructed their voyage, covering the sea in all directions with floating mountains and valleys, so that they came to an anchor off an inlet where, on a former voyage, the Hollanders had erected the precious emblem of the Christian faith, and named the dreary solitude Cross Island. But these pilgrims, as they now approached the spot, found no worshippers there, while as if in horrible mockery of their piety, two enormous white bears had reared themselves in an erect posture, in order the better to survey their visitors, directly at the foot of the cross. The party which had just landed, were unarmed, and were for making off, as fast as possible, to their boats. But Skipper Heemskirk, feeling that this would be death to all of them, said simply, "The first man who runs shall have this boat-hook of mine in his hide. Let us remain together and face them off." It was done. The party moved slowly towards their boats, Heemskirk himself bringing up the rear, and fairly staring the polar monsters out of countenance, who remained grimly regarding them, and ramping⁶ about the cross. The sailors got into their boat with much deliberation, and escaped to the ship, glad enough that they were alive to tell the story.

On the 15th of August they reached the Isles of Orange, on the extreme north-eastern verge of Nova Zembla. Here a party going ashore, climbed to the top

of a rising ground, and to their infinite delight beheld an open sea, entirely free from ice, stretching to the south-east as far as eye could reach. At last the game was won, the passage to Cathay⁷ was discovered. Full of joy, they pulled back in their boat to the ship, "not knowing how to get there quick enough to tell Barendz." Alas ! they were not aware of the action of that mighty ocean-river the Gulf-stream, which was sweeping around those regions, with its warm dissolving current. Three days later they returned, baffled in their sanguine efforts to sail through the open sea. The ice had returned upon them, setting south-westwardly in obedience to the same impulse which for a moment had driven it away, and they found themselves again imprisoned. On the 25th of August they had given up all the high hopes, with which they had been so lately inspired, and the rapidly waning summer disposed them to effect their retreat by the south side of Nova Zembla, and so through the Straits of Nassau, home. In vain. The catastrophe was upon them. As they struggled slowly past the "Ice Haven," the floating mountains and glaciers, impelled by the mighty current, once more gathered around and forced them back to that horrible harbour. During the remaining days of August the ship struggled, almost like a living creature, with the perils that beset her ; now rearing in the air her bows propped upon mighty blocks, till she absolutely sat erect upon her stern, now lying prostrate on her side, and anon righting again, as the ice masses would for a moment float away, and leave her breathing-space and room to move in. A blinding snow-storm was raging the while ; the ice was cracking and groaning in all directions, and the ship was shrieking so, that the medley of awful sights *and sounds* was beyond the power of language. But the

agony was soon over. By the 1st of September the ship was hard and fast. The ice was as immovable as the dry land, and she would not move again that year, even if she ever floated. Those pilgrims from the little republic were to spend the winter in their Arctic harbour.

ART II.

They resigned themselves without a murmur to their inevitable fate, and having a considerable supply of drift-wood, resolved to build a house, in which they might shelter themselves from the wild beasts, and from their still more cruel enemy, the cold. Six weeks of steady cheerful labour succeeded. Tremendous snow-storms, accompanied by hurricanes of wind, often filled the atmosphere to suffocation, so that no human being could move a ship's length without perishing; while, did any of their number venture forth as the tempest subsided, it was often to find himself almost in the arms of a polar bear, before the dangerous snow-white form could be distinguished, moving sluggishly through the white chaos.⁸

For these hungry companions never left them, so long as the sun remained above the horizon, swarming like insects and birds in tropical lands. When the sailors put their meat tubs out for a moment upon the ice, a bear's intrusive muzzle would forthwith be inserted to inspect the contents. By the beginning of October the weather became so intensely cold, that it was almost impossible to work. However, on the 12th of October, they moved into their house, and slept there for the first time, while a bear, profiting by their absence, passed the night in the deserted ship.

On the 4th of November the sun rose no more, but

the moon, at first, shone day and night, until they were once in great perplexity to know whether it was midday or midnight. It proved to be exactly noon. The bears disappeared with the sun, but white foxes swarmed in their stead, and all day and night were heard scrambling over their roof. These were caught daily in traps, and furnished them with food, besides furs for raiment. The cold became appalling, and they looked in each other's faces sometimes in speechless amazement. Their clothes were frozen stiff. Their shoes were like iron, so that they were obliged to array themselves from head to foot in the skins of the wild foxes. The clocks stopped. The beer became solid. The Spanish wine froze, and had to be melted in saucepans. The smoke in the house blinded them; the fire did not warm them, and their garments were often in a blaze, while their bodies were half frozen. All through the month of December, an almost perpetual snow-deluge fell from the clouds. For days together they were unable to emerge, and it was then only, by most vigorous labours, that they could succeed in digging a passage out of their buried house.

On the 24th January it was clear weather, and comparatively mild, so that Heemskirk and two others walked on the strand. To their infinite delight and surprise, they again saw the disc⁹ of the sun, on the edge of the horizon, and they all hastened back with the glad tidings. But Barendz shook his head. Many days must elapse, he said, before the declination of the sun would be once more 14° , at which point in the latitude of 76° they had lost sight of him on the 4th of November. This, according to his calculation, would be on the 10th of February. The facts and theory of refraction¹⁰ were not then thoroughly understood—pilot Barendz could *not be expected* to be wiser than his generation. At

last, on the 17th of April, some of them, climbing over the icebergs to the shore, found much open sea. They also saw a small bird diving in the water, and looked upon it as a halcyon¹¹ and harbinger¹² of better fortunes. The open weather continuing, they began to hanker for the Fatherland. So they brought the matter "not mutinously, but modestly," before Barendz, that he might suggest it to Heemskirk, for they were all willing to submit to his better judgment. It was determined to wait through the month of May. It was soon obvious, that the ship was hard and fast, and that she would never float again. They now set to work repairing and making ready the frail skiffs which were their only hope, and supplying them with provisions and even with merchandise from the ship. The ravages made by the terrible winter upon the strength of the men became painfully apparent. But Heemskirk encouraged them to persevere. "For," said he, "if the boats are not got soon under weigh, we must be content to make our graves here, as burghers of Nova Zembla."

On the 14th of June they launched the boats, "and trusting themselves to God," embarked once more upon the Arctic Sea. Barendz, who was too ill to walk, and Claas Anderson, also sick unto death, were dragged to the strand in sleds, and tenderly placed on board. Barendz had, however, despite his illness, drawn up a triple record of their voyage; one copy being fastened to the chimney of their deserted house, and one being placed in each of the boats.

Their voyage was full of danger, as they slowly retraced their way along the track, by which they reached the memorable Ice Haven. Off the Ice Host both boats came alongside each other, and Heemskirk called out to *Barendz to ask how it was with him.*

"All right, mate," replied Barendz cheerfully; "I hope to be on my legs again before we reach the Ward-huis."

Then he begged De Veer to lift him up, that he might look upon the Ice Host once more. The icebergs crowded around them. There was "a hideous groaning and bursting, and driving of the ice, and it seemed every moment, as if the boats were to be dashed into a hundred pieces." It was plain that their voyage would now be finished for ever, were it not possible for some one of their number, to get upon the solid ice beyond, and make fast a line. "But who will run the risk?" said De Veer, who soon, however, volunteered himself, being the lightest of all. Leaping from one floating block to another, at the imminent risk of being swept off into space, he at last reached a stationary island and fastened his rope. Thus they warped themselves once more into the open sea. On June 20th, Barendz lay in the boat, studying carefully the charts which they had made of the land and water discovered in their voyage. Tossing about in an open skiff upon a polar sea, too weak to sit upright, reduced by the unexampled sufferings of that horrible winter almost to a shadow, he still preserved his cheerfulness, and maintained that he would yet, with God's help, perform his destined task. In his next attempt he would steer north-east from the North Cape, he said, and so discover the passage.

While he was "thus prattling," the boatswain of the other boat came on board, and said that Claas Anderson would hold out but little longer.

Then said Barendz, "Methinks I too shall last but a little while. Gersit, give me to drink." When he had drunk, he turned his eyes on De Veer, and suddenly *breathed his last.*

Great was the dismay of his companions, for they had been deceived by the dauntless energy of the man, thus holding tenaciously to his great purpose, unbaffled by danger and disappointment, even to the last instant of life. He was their chief pilot and guide, "in whom next to God they trusted ;" and thus the hero, who for vivid intelligence, courage, and perseverance amid every obstacle, is fit to be classed among the noblest of maritime adventurers, had ended his career. Nor was it unmeet, that the man, who had led those three great, though unsuccessful, enterprises towards the North Pole, should be laid at last at rest—like the soldier dying in a last battle—upon the field of his glorious labours. Nearly six weeks longer the survivors struggled amid tempestuous seas, at last reaching Schanshoek, on July 28th. From thence they made their way, through many hardships, to the mouth of the Meuse, where they dropped anchor on the 29th of October, finally arriving at Amsterdam on the 1st of November, after an absence of seventeen months, ten of which had been passed under the latitude of 76° in a frozen desert, where no human beings had ever dwelt before.

"*United Netherlands*"—MOTLEY.

1. GLACIERS, fields of ice.
2. SPITZ-BERGEN, the name signifies *pointed mountains*.
3. DENIZENS, dwellers within.
4. MONOTONY, dull uniformity. (Gr. *monos*, alone, and *tonos*, a tone or note.)
5. NOVA ZEMBLA, islands in the Arctic Ocean, north of Russia.
6. RAMPING, climbing, and leaping with violence.
7. CATHAY, a name given by the Europeans in the Middle Ages, to China and the neighbouring states.
8. CHAOS, disorder, confusion.
9. DISK, the face of a celestial body as it appears to the eye.
10. REFRACTION, the change in the direction of the rays of light when they enter a different medium, as the atmosphere ; lit., *to break back or open*. (Lat. *re*, back, *frango*, to break.)
11. HALCFON, lit., *the breeder on the sea* ; the king-fisher, so

called because once believed to make a floating nest on the sea, which remained calm while it was hatching ; its appearance, therefore, betokened fine weather ; and *halcyon* is often used in the sense of peaceful, happy.

12. HARBINGER, one who goes before to provide *harbour* or lodging ; a forerunner.

BIOGRAPHICAL SKETCH OF THE POET SHELLEY.

PERCY BYSSHE SHELLEY was born near Horsham, Sussex, in 1792, and was drowned when boating in the Bay of Spezzia, north of Italy, in 1822. He was the eldest son of a baronet, but did not live to succeed to the title.

He was educated at Eton and Oxford, but his contempt for all established laws and regulations caused him to be expelled from the university.

Shelley's genius was of a high order, and the qualities of his heart and mind were such as to win for him many true and lasting friends. His first published poem, "The Revolt of Islam," showed so much power and originality that the author was immediately welcomed as a true poet, and his subsequent works fully justified this opinion ; the most famous of these are "Queen Mab," "Prometheus Unbound," and "Alastor," but among his shorter pieces none are more universally and justly admired than "The Sensitive Plant."

THE SENSITIVE PLANT.

A Sensitive Plant in a garden grew,
And the young winds fed it with silver dew,
And it opened its fan, like leaves to the light,
And closed them beneath the kisses of night.
And the Spring arose on the garden fair,
And the Spirit of Love fell everywhere ;
And each flower and herb on Earth's dark breast,
Rose from the dreams of its wintry rest.
The snowdrop, and then the violet,
Arose from the ground with warm rain wet,

And their breath was mixed with fresh odours sent
From the turf, like the voice and the instrument.

Then the pied¹ wind-flowers and the tulip tall,
And narcissi,² the fairest among them all,
Who gaze on their eyes in the stream's recess,
Till they die of their own dear loveliness.

And the naiad³-like lily of the vale,
Whom love makes so fair and passion so pale,
That the light of its tremulous bells is seen
Through their pavilion of tender green.

And the hyacinth, purple, and white, and blue,
Which flung from its bells a sweet peal anew
Of music so delicate, soft and intense,
It was like an odour within the sense.

And the wand-like lily, which lighted up,
As a Mænad,⁴ its moonlight-coloured cup,
Till the fiery star which is its eye,
Gazed through clear dew on the tender sky.

And the jessamine faint, and the sweet tuberose,
The sweetest flower for scent that blows ;
And all rare blossoms from every clime
Grew in that garden in perfect prime.

And on the stream whose inconstant bosom
Was pranked,⁵ under boughs of embowering blossom,
With golden and green light, slanting through
Their heaven of many a tangled hue,

Broad water-lilies lay tremulously,
And starry river-buds glimmered by, [glance
And around them the soft stream did glide and
With a motion of sweet sound and radiance.

And the sinuous⁶ paths of lawn and of moss,
Which led through the garden along and across,
Some open at once to the sun and the breeze,
Some lost among bowers of blossoming trees,

Were all paved with daisies and delicate bells,
As fair as the fabled asphodels,⁷
And flowerets which, drooping as day drooped too,
Fell into pavilions, white, purple, and blue,
To roof the glow-worm from evening dew.

.

But the Sensitive Plant has no bright flower,
Radiance and odour are not its dower ;
It loves, even like Love, its deep heart is full,
It desires, what it has not—the beautiful !

The light winds which, from unsustaining wings,
Shed the music of many murmurings,
The beams which dart from many a star
Of the flowers whose hues they bear afar :

The plumed insects, swift and free,
Like golden boats on a sunny sea,
Laden with light and odour, which pass
Over the gleam of the living grass :

The unseen clouds of the dew, which lie
Like fire in the flowers till the sun rides high,
Then wander like spirits among the spheres,
Each cloud faint with the fragrance it bears.

The quivering vapours of dim noon-tide,
Which, like a sea, o'er the warm earth glide,
In which every sound, and odour, and beam,
Move as reeds on a single stream.

Each and all like ministering angels were,
 For the Sensitive Plant sweet joys to bear,
 Whilst the lagging hours of the day went by,
 Like the windless clouds o'er a tender sky.

And when evening descended from heaven above,
 And the earth was all rest, and the air was all love,
 And delight, though less bright, was far more deep,
 And the day's veil fell from the world of sleep ;

And the beasts and the birds, and the insects were
 drowned

In an ocean of dreams, without a sound ;
 Whose waves never mark, though they ever impress
 The light sand which paves it,—unconsciousness ;

The Sensitive Plant was the earliest
 Up-gathered into the bosom of rest ;
 A sweet child weary of its delight,
 The feeblest, and yet the favourite,
 Cradled within the embrace of night.

SHELLEY.

1. PIED, of various colours ; lit., *that which is painted*.
2. NARCISSI, plural of narcissus, a genus of flowering plants, comprising the daffodil, &c.
3. NAIAD, a water nymph, or female deity.
4. MÆNADES, the female companions of Bacchus, the god of wine.
5. PRANKT, decorated ; adorned.
6. SINUOUS, winding ; bending in and out.
7. ASPHODELS, flowers of the lily tribe.

AUSTRALIAN DISCOVERIES.

ANY one who looks at a map of Western Australia, cannot fail to observe, that the names upon its shore-line belong to *three different languages*. French, Dutch, and

English words occur among the names of its capes, bays, and headlands, and testify to the nationality of the adventurous seamen, who at distant intervals surveyed the coast.

There seems, however, to be a probability, that the existence of Australia was first surmised by the Portuguese, who established colonies in India and the Spice Islands at a very early period; and a story goes that one John Botz of the Portuguese service, made a map which he presented to Henry VIII. in 1542, wherein a portion of the Austral-Continent was delineated under the name of Great Java. Whatever foundation there may be for this statement, it is nevertheless certain, that Australia virtually¹ remained an unknown and mysterious territory, until the beginning of the seventeenth century, when Dutch and Spaniards began to press hard upon each others' heels in the task of unveiling it, and the latter not only carried off the chief honours of discovery, but also published the earliest accounts of the "Great South Land," which can be considered authentic.

The name of Australia, which Flinders suggested should be applied collectively to the whole of the continent, was first invented by the Spanish admiral, Igniros, as the designation of that part of it which he discovered in the year 1608. The earliest pioneers² of Western Australia, however, seem to have been exclusively Dutch, for its entire sea-board is in old maps, parcelled out into separate "lands," each of which bears the name of a Dutchman or of his ship. Tasman's Land, De Witt's Land, &c., encircled what is now called Western Australia, in a connected chain, from its northern to its southern limit; each link having had geographical existence before the middle of the seventeenth century,

when people made voyages of discovery without chronometers, and in vessels that were sometimes not many sizes bigger than a modern coast-guard cutter.

The river Swan became known to Europeans, under the auspices of a Dutch commander, named William Vlaming, who discovered, upon the 3rd of January 1697, the mouth of a stream much frequented by black swans, and a neighbouring island that swarmed with kangaroo rats. Vlaming bestowed upon the island the appropriate name of Rottnest, or the "rats' nest," and called the stream the Black Swan River, but the name has long since lost the first of its adjectives, and the birds that once haunted its waters have also much withdrawn themselves from observation.

Coasting northward, Vlaming landed upon an island, named after the navigator Dirk Hartog, and here he had the good fortune to find a written memorial, which Dirk Hartog himself had left there eighty-one years previously. A pewter plate nailed to a tree, bore an inscription to the effect that the ship *Endracht* of Amsterdam had arrived at that island on October 25th, 1616: Captain Dirk Hartog; and that she had sailed two days afterwards for Bantam. Vlaming replaced the pewter document after appending a second inscription, recording his own arrival on that spot on February 4th, 1697. A French commander touched on this island in 1802, and found the ancient log half buried in the sand, with the two inscriptions still legible in spite of the 186 years which had passed since the writing of the first, and the 105 since the addition of the second. Perhaps the Frenchman thought the non-destructive nature of the climate had been sufficiently tried, for he bore away the interesting relic,³ and it is said to be now preserved in Paris. The northern point of Dirk Hartog's island

is still called Cape Inscription, though the object is removed that conferred the name upon it.

As far as I can ascertain, the first English mariner, who appeared off the coast of Australia, was Dampier, formerly a buccaneer or sea-robber, who was deputed by the British Government to conduct a voyage of discovery to the South Seas, in the reign of William III., and who gave his name to a cluster of little islands off the coast. Some way south of these islands is Shark's Bay, which does not seem to have received its descriptive name without good reason. In this bay Dampier caught a shark, that measured eleven feet in length, "with a maw⁴ like a leather sack, very thick, and so tough that a sharp knife could scarce cut it."

After this many Frenchmen visited Australia, among others the Captain Baudin who carried off Dirk Hartog's inscription, and some of them appear to have been under the impression that a navigator's first duty lay in the invention of a fresh set of names for other people's discoveries, but they did not lay claim to any part of the country. "*Life in W. Australia,*" by MRS MILLETT.

1. VIRTUALLY, in effect though not in fact.
2. PIONEERS, those who go before to prepare a path for others.
3. RELIC, a memorial ; lit., *that which is left*. (Lat. *relictum*, that which is left behind.)
4. MAW, the stomach.

VALUABLE TREES OF AUSTRALIA.

HUNDREDS upon hundreds of square miles of Western Australia are covered with forests of magnificent trees, many kinds of which are of great value to the house-carpenter, the machinist, and the ship-builder ; but *none of them* more pre-eminently important than that

which in common conversation is called "native mahogany." The qualities of this wood may even bear the palm when placed in rivalry with heart of oak. The white ant, the barnacle, and other boring insects are alike foiled¹ by its power of resistance; but its most striking characteristic is, that it scarcely shows the slightest symptom of decay after having been many years steeped in water. A log, which had formed part of an old bridge, and had been seventeen years immersed, was exhibited in London in 1862, one of its sides being planed and polished, in order to show the slight extent to which it had deteriorated.² Although exposed to water for so long a period, and with three feet of its length sunk in mud, one inch alone was in a state that could have been described as less good than new. The bark of the mahogany grows in a singular manner, for it is matted round about the trunk in twisted lines.

The timber, which ranks next in importance, and is said, indeed, to be of nearly equal value for naval purposes, is another species of the same botanical class (*Eucalyptus*), known to the colonists as the "blue gum," which, in the words of an old report, "attains to a very considerable growth in many parts of the country, and exceeds the size required for beams of the largest man-of-war." The blue gum is said to be unfit for masts and spars on account of its great weight: it attains a straight growth of more than 100 feet without knot or branch; at this point it throws out its branches, the leaves upon which hang straight down from their stalks. This form of growth is common to all the large trees of Australia, which give no real shade, as the sun penetrates directly through their foliage.

Another tree of this class is the "white gum," named from its bare white stem, from which the bark falls off

yearly. It is little valued as timber, differing in this respect from another brother, the "red gum," which furnishes a hard close-grained timber, but its numerous "gum veins" render it unfit for outer planking. The gum, which exudes from these trees, is an article of commerce, and is much used in Manchester and elsewhere for stiffening calico. It is used in Australia as a sweet-meat, and children seldom pass a tree without stuffing a piece into their mouths.

Another close and hard-grained timber is that of the "York gum." I have heard of a pair of dray wheels made of this wood, which had been in constant use for more than four years without showing signs of decay.

The Shea-oak has been found valuable to the cooper, and the wood is beautifully marked, and capable of being worked down to a very thin edge, but the chief use, to which it is applied, is the roofing of houses, for which purpose the wood is cut into long narrow pieces called "shingles," of the shape of slates or tiles : and this kind of roofing is common throughout Australia. To be a "shingle short" is a colonial phrase, indicative of the same state of mind which is described in Scotland by the expression of "a bee in the bonnet."

A vast number of sandal-wood trees grow in West Australia ; these are chiefly sent to China, where they are burned in the idol temples ; the sweet scented wood is much prized by turners.

Many other valuable trees grow in Australia, as the "raspberry jam," and many other acacias, which bear thousands of beautiful flowers ; the wood and blossoms of the raspberry jam have a sweet perfume resembling the preserve, from which it is named.

A most curious and important vegetable production is the grass-tree (*Xanthorrhœa*), called "Black-boy" by

the colonists. The stem is bare, and often quite straight, about ten or fourteen inches in diameter, with a wide spreading foliage at the top, which one must call grass for want of a better name, though it quite as much resembles rushes; on which, in many of the runs, the cattle depend mainly for their food. The last year's crop, if it has not been eaten off, hangs down like a beard, brown and faded, in which state it is used for all descriptions of thatching, having only one drawback, its inflammability.

The Black-boys vary in height from one foot to twenty, and when seen for the first time, and from a distance, might easily be mistaken for savages dressed in the wavy head-dress of the South Sea Islanders. When the upper part is of a fresh green colour, there often rises from the centre of the grass a tall slender rod shaped like a bulrush or a poker. The colour of the stem is not naturally black, but brown; nevertheless, most of them are so completely blackened with bush-fires, that they look as much like a piece of stove-piping as can well be imagined. The body of the tree is most curiously formed of shining resinous flakes, which are highly inflammable, and when set alight, burn with great brilliancy.

Another useful production of the colony is "palm wool," a fine elastic substance resembling wool, which is found at the base of the leaves or fronds of the *Zamia*, a kind of palm, which grows freely on Swan River; it is much used for bedding and similar purposes.

In spite, however, of all these trees, and many others of nearly equal value, one looks in vain for any fruit-bearing trees, or indeed any eatable vegetable; and though the scarlet seed-pods of the *Zamia* are eaten, they are decidedly *poisonous* unless buried underground for a

fortnight. Our little native girl once dug up for me a root about two inches long, which she begged me to taste, and which was not amiss.

The only wild fruit that I ever heard of was the native cherry, a fruit almost entirely composed of a hard kernel the size of a marble, with a thin outside rind that has an acid taste, and of which the colonists make a sweetmeat in default of anything better. The stone is buff-coloured and much corrugated,³ and when a good number of them are strung together, and alternated with the nuts of the sandal-wood, they make a pretty row of beads, a purpose for which nature seems to have intended them.

Western Australia is, however, essentially a land of flowers, and myriads of lovely plants overrun the ground, which are the ornaments of our conservatories at home.—“*Life in West Australia*,” by MRS MILLETT.

1. FOILED, baffled.
2. DETERIORATED, made worse, reduced in quality.
3. CORRUGATED, wrinkled, drawn into folds.

CHARACTER OF THE HAPPY WARRIOR.

WHO is the happy warrior? Who is he
That every man in arms should wish to be?
It is the generous spirit, who, when brought
Among the tasks of real life, hath wrought
Upon the plan, that pleased his childish thought:
Whose high endeavours are an inward light
That makes the path before him always bright:
Who, with a natural instinct to discern
What knowledge can perform, is diligent to learn;

Abides by his resolve, and stops not there,
But makes his moral being his prime care :
Who, doomed to go in company with pain,
And fear, and bloodshed—miserable train !
Turns his necessity to glorious gain ;
In face of these doth exercise a power,
Which is our human nature's highest dower ;
Controls them and subdues, transmutes, bereaves
Of their bad influence, and their good receives.
By objects, which might force the soul to abate
Her feeling, rendered more compassionate ;
Is placable—because occasions rise
So often, that demand such sacrifice.
More skilful in self-knowledge, even more pure
As tempted more ; more able to endure,
As more exposed to suffering and distress ;
Thence, also, more alive to tenderness.
'Tis he whose law is reason ; who depends
Upon that law as on the best of friends,
Who fixes good on good alone, and owes
To virtue every triumph, that he knows ;
Who, if he rise to station of command,
Rises by open means ; and there will stand
On honourable terms, or else retire,
And in himself possess his own desire.

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'Tis finally the man, who lifted high,
Conspicuous object in a nation's eye,
Or left unthought of in obscurity,—
Who, with a toward ¹ or untoward lot,
Prosperous or adverse, to his wish or not,
Plays in the many games of life that one,
Where, what he most doth value, must be won :

Whom neither shape of danger can dismay,
Nor thought of tender happiness betray :
Who not content, that former worth stand fast,
Looks forward, persevering to the last ;
From well to better, daily self-surpast :
Who, whether praise of him must walk the earth
For ever, and to noble deeds give birth,
Or he must go to dust without his fame,
And leave a dead unprofitable name,
Finds comfort in himself and in his cause ;
And, while the mortal mist is gathering, draws
His breath in confidence of Heaven's applause :
This is the happy warrior ; this is he
Whom every man in arms should wish to be.

WORDSWORTH.¹

1. TOWARD, apt, favourable.

2. WORDSWORTH, for biographical sketch of this poet, see Fifth Book, p. 15.

TAME CARP AT FONTAINEBLEAU.

THE Carp is a fish, of which there are many species scattered over nearly the whole world. They love fresh and quiet waters, and are found in ponds, lakes, and the still deep pools of a river, where they feed on herbs, grains and even mud, but seldom eat other fish or insects ; though they will not always refuse a hook well baited with grasshoppers or worms. In order to furnish them with fresh vegetable food, it is usual to rake the edges of ponds, in which they are kept, when left dry in the summer, and sow them with grass seed, so that when the pond is again filled by the rain, the carp find plenty of nice young grass to eat.

The carp have small mouths, toothless jaws, and gills

composed of thin flat rays. They have one fin along the back-bone, and are covered with large scales. But although these fish have no teeth in their mouths, they are not destitute of those necessary articles, but have several large ones in the gullet,¹ which press the food between themselves and a glutinous knob,² connected with a bony plate forming part of the skull, and commonly called the carp's *tongue*.

Under common circumstances the carp grow from two to three inches in length in a year, but when exceedingly well supplied with food, they have been known to grow from five to eighteen inches in the same time. They also increase rapidly in numbers, as they spawn three times a year.

When kept in ponds, and fed, carp become exceedingly tame, and the famous angler,³ Izaak Walton,⁴ mentions one that came to be fed "at the ringing of a bell or the beating of a drum;" others will come when called or whistled to.

In the gardens of Fontainebleau near Paris, is a large lake stocked with these fish, many of which are very large, and decidedly tyrannical towards their smaller brethren. An amusing account of their proceedings is given in the following extract:—

"Freed from all angling arts and lures,⁵ the Fontainebleau carp live a life of great enjoyment, marred only, we imagine, by their immense numbers, which must cause the supply of food to be somewhat below their requirements. It is not, however, very easy to define what a carp's food requirements are, for he is a voracious⁶ creature, eating whenever he has an opportunity, until he can absolutely eat no more. His favourite food consists of vegetable substances, masticated⁷ by means of his flat teeth, which work with a mill-stone

kind of movement. When this fish obtains an abundant supply of food, it grows to an enormous size. Several continental rivers and lakes are very congenial⁸ to carp, especially the Oder,⁹ where this fish occasionally attains the enormous weight of 60lbs. It is not probable that any carp in the lake at Fontainebleau are so large as this; but there are certainly many weighing 50lbs., patriarchs¹⁰ of their kind, which, though olive-hued in their tender years, are now white with age. That the great size of these fish is due to ample feeding is, we think, evident; and, as we shall see presently, it is the large fish that are the best fed.

"During many years the feeding of the carp at Fontainebleau has been a favourite Court pastime. But it is from the visitors who frequent Fontainebleau during a great part of the year, that the carp receive their most bountiful rations. Big carp have an enormous swallow, soft penny rolls being mere mouthfuls, bolted with ostrich-like celerity. To prevent the immediate disappearance of these dainty morsels, bread, in the form of larger balls than the most capacious carp can take into his gullet, is baked until it becomes as hard as a biscuit, and with these balls the carp are regaled.

"Throw one into the lake, and you will quickly have an idea of the enormous carp population it contains. For no sooner does the bread touch the water, than it is surrounded by hundreds of these fish, which dart to it from all sides. And now if you look attentively, you will witness a curious display of instinct, which might almost take a higher name. Conscious apparently of their inability to crush these extremely hard balls, the carp combine with surprising singleness of intention, to push them with their noses to that part of the lake *which is bounded by a wall, and when there they butt*

at them, until at last their repeated blows, and the softening effect of the water causes them to yield and open. And now you will see another curious sight. While shoals of carp have been pounding away at the bread-balls, preparing them for being swallowed, some dozen monsters hover round, indifferent, apparently, to what is passing. But not so, for no sooner is the bread ready for eating, than two or three of these giants, but more generally one—the tyrant probably of the lake—rush to the prize, cleaving the shoals of smaller carp, and shouldering them to the right and left, seize the bread with open jaws, between which it quickly disappears.”

Gold and silver fish belong to the carp family, and are believed to have come originally from China; they live and breed very contentedly in glass globes and small ponds; these fish then become exceedingly tame, and capable of some personal attachment to those who feed them, and whose footsteps they can distinguish at a little distance; one gentleman assures us that they appreciate music, and like being whistled to. And Pliny speaks of a Roman Emperor who kept these and other fish in ponds, and declares that these had all separate names, and would come when called.

Adapted from “The Athenæum.”

1. GULLET, the throat.
2. GLUTINOUS, like glue: tenacious.
3. ANGLEB, one who fishes with a hook.
4. ISAAC WALTON, an ingenious and amusing writer. Born 1593, died 1683. Author of “The Complete Angler,” and some biographies.
5. LURE, bait to attract wild animals: any enticement.
6. VORACIOUS, eager to devour.
7. MASTICATED, chewed: ground with the teeth.
8. CONGENIAL, suitable: of the same nature or feeling.
9. ODER, a large river which rises in Moravia, traverses Prussia, and falls into the Baltic by three mouths.
10. PATRIARCH, chief father: head of a family.

THE BUCCANEERS, AND ORIGIN OF THE NAME .

THE cruelty of the Spaniards to the native inhabitants of Cuba¹ terminated in the depopulation of that fine island. The cattle at the same time multiplied in great numbers, and roved over the deserted tracts of its western districts. This, in consequence, became the victualling station for all the foreign vessels, which cruised among the Spanish settlements, whether in the West Indies or Pacific Ocean, and carried on with them a contraband² trade. The preparation of the meat became a regular business. Spanish hunters, called *matadores* or slaughterers, killed the cattle: the flesh was then dried and prepared according to the Carib method, on hurdles raised a few feet above the fire. This method of dressing their food was called by the Indians *boocan*,—a name which they applied to the apparatus used in the process, and to the meat itself: hence the persons, who were employed in procuring provisions for the cruisers, adopting the language with the habits of the natives, called themselves *buccaneers*. A large majority of the adventurers in these seas were English; and as their smuggling trade quickly degenerated into actual piracy, they took the designation of freebooters.

There was a natural alliance between the freebooters and buccaneers; they mutually depended on one another; the avocations³ of one party being at sea, those of the other on land. It is probable that in many instances the pirate cured his own provisions, and so united both professions in his own person. But in general the hunters were distinct from the seamen; and *in process of time*, a number of the hunters or buccaneers

were French, while the rovers were chiefly English : yet the adventurers of these two nations whimsically thought fit to borrow the name of their profession from the language of the other ; and the English called themselves buccaneers, while the French preferred the title of freebooters, often corrupted into *filibustiers*. All these adventurers, of whatever nation, preyed upon the Spaniards, who were the sole objects of attack. A sense of common interest bound them together, and formed them into a society which styled itself the Brethren of the Coast.

The buccaneers had peculiar customs, which obtained among them, from necessity or tradition, the authority of law. Their code of morality was such, as might be expected among men who, while they renounced a friendly intercourse with the rest of mankind, depended upon each other's fidelity. Every buccaneer had a mate, who was the heir to all his money. In some instances, a community of property existed among them. Negligence of dress, and even dirtiness, was prescribed⁴ by their fashions as best befitting a desperado.

The association of the buccaneers gave rise to a greater number of bold navigations than had previously proceeded, in an equal space of time, from the rival states of Europe. Those who commanded in the South Seas were almost all Englishmen ; and many of them were evidently able seamen and otherwise persons of ability. In the narratives of Dampier and of Cowley, the toils and dangers of a roving life were shown combined with much to exhilarate and delight, and a voyage round the world was no longer looked upon as a wonderful achievement. Mariners grew more daring, and ceased to associate the ideas of danger and of distance.

From the time of Sir Francis Drake,⁵ England rose

steadily in maritime power, and continued to send forth the most skilful and intrepid seamen ; and it redounds not a little to her honour, that the first expedition equipped solely for the purpose of making geographical discoveries, and without any ulterior⁶ objects of political or commercial gain, was despatched from her shores in 1699, under the command of the famous buccaneer, William Dampier, to explore the coasts of New Holland and New Guinea, and to discover new countries.

"Inland and Maritime Discovery,"
by W. D. COOLEY.

1. CUBA, the largest of the West Indian Islands, discovered by the Spaniards in 1492, and still retained by them.
2. CONTRABAND, illegal ; against, or contrary to ban or law.
3. AVOCATION, an engagement or business that calls for one's time and attention. (Lat. *roco*, to call.)
4. PRESCRIBED, appointed. (Lat. *pre*, before ; *scribo*, to write.)
5. SIR FRANCIS DRAKE, see Fifth Book, p. 205.
6. ULTERIOR, beyond ; further. (Lat. *ulterior*, comparative of *ultra*, beyond.)

GIBRALTAR.

WE were glad to find a steamer leaving next morning for Algeciras¹ opposite Gibraltar.² It was a lovely day and a calm sea, which was a great subject of rejoicing, for even as it was, the rickety Spanish vessel rolled disagreeably. Owing to the miserable slowness of everything, we were eleven hours on board. There was little interest, till we reached the yellow headland of Trafalgar.³ Then the rugged outlines of the African coast rose before us, and we entered the Straits, between Tarifa⁴ sleeping amid its orange groves on the Spanish coast, and the fine African peaks above Ceuta.⁵ Soon, on the left, the great *Rock of Gibraltar* rose from the sea like an island, though

not the most precipitous side, which turns inward towards the Mediterranean. But it was already gun-fire, and too late to join another steamer and land at the town, so we waited for a shoal of small boats which put out from Algeciras, and surrounded our steamer to carry us on shore.

Here we found in the *Fonda Inglesa* (English Hotel), kept by an English landlady, one of the most primitive but charming little hotels we ever entered. The view from our rooms alone decided us to stay there some days. Hence, framed by the balcony, Gibraltar rose before us, in all the glory of its rugged, sharp-edged cliffs, grey in the morning, pink in the evening twilight, with the town at its feet, whence, at night, thousands of lights were reflected in the still water. In the foreground were groups of fishing-boats at anchor, and here and there a lateen⁶ sail flitted, like a white albatross⁷ across the bay.

On the little pier beneath us was endless life and movement; knots of fishermen in their blue shirts and scarlet caps and sashes, mingling with solemn-looking Moors in turbans, yellow slippers and flowing burnouses,⁸ who were watching the arrival or embarkation of their wares; and an endless variety of travellers from all parts of Europe, waiting for different steamers, or come over to see the place. Here an invalid might stay, imbibing health from the fine air and sunshine, and never be weary of the ever-changing diorama.⁹ In every direction delightful walks wind along the cliffs through groves of aloes¹⁰ and prickly pear.¹¹ Behind the town a fine old aqueduct¹² strides across the valley, and beyond it the wild moors begin at once sweeping backwards to a rugged chain of mountains.

It was with real regret, that we left Algeciras, and made the short voyage across the bay to Gibraltar, where

we instantly found ourselves in a place as unlike Spain as it is possible to imagine. Upon the wharf you are assailed by a clamour of English-speaking porters and boatmen. Passing the gates, you come upon a barrack-yard swarming with tall British soldiers, looking wonderfully bright and handsome, after the insignificant figures, and soiled, shabby uniforms of the Spanish army. Hence the Waterport Street opens, the principal thoroughfare of the town, though, from its insignificant shops with English names, and its low public-house, you have to look up to the strip of bright blue sky above, to be reminded that you are not in an English seaport.

Just outside the principal town, between it and the suburb of Europa, is the truly beautiful Alameda, an immense artificial garden, where endless gravel paths wind through labyrinths¹³ of flowers, which are all in their full blaze of beauty under the March sun, though the heat causes them to wither and droop before May. One succession of gardens occupies the western base of the rock, and most luxurious and gigantic are the flowers that bloom in them; the eastern side, in great part, a perpendicular precipice, is elsewhere left uncultivated, and is wild and striking in the highest degree. On the northern side of the rock are the famous galleries tunnelled in the face of the precipice, with cannon pointing towards Spain from their embrasures.¹⁴

Through these, or better, by delightful paths fringed with palinitos¹⁵ and asphodel,¹⁶ you may reach El Hacho, the signal station, whence the view is truly magnificent over the sea, and the mountain chain of the two continents, and down into the blue abysses beneath the tremendous precipice upon which it is placed.

"Wanderings in Spain," by AUGUSTUS J. C. HARE.

1. ALGECIRAS, a town in Spain on the west side of the Bay of Gibraltar.
2. GIBRALTAR, a celebrated fortress which has been in possession of the British since 1704.
3. TRAFALGAR, a cape on the coast of Andalusia, memorable for the victory gained by the British fleet under Lord Nelson in 1805.
4. TARIFA, a small seaport on the most southerly point of Spain.
5. CEUTA, a seaport in Morocco.
6. LATEN SAIL, a triangular sail common in the Mediterranean.
7. ALBATROSS, a large voracious sea-bird.
8. BURNOUSES, Arab or Moorish cloaks.
9. DIORAMA, an exhibition of pictures viewed through apertures in the wall of a darkened chamber; a succession of views.
10. ALOES, a genus of plants of the order *Liliaceæ*, from which the gum called aloes is extracted.
11. PRICKLY-PEAR, a class of plants covered with clusters of strong hairs or prickles, bearing a fruit like the pear.
12. AQUEDUCT, an artificial channel for conveying water.
13. LABYRINTH, a maze, a place full of windings.
14. EMBRASURE, an opening in a wall or parapet through which cannon are pointed.
15. PALM-TREE, a species of palm tree.
16. ASPHODEL, a genus of plants of the order *Liliaceæ*.

THE BATTLE OF SEDGEMOOR.*

ON Thursday, the 2d of July, Monmouth again entered Bridgewater, in circumstances far less cheering than those in which he had marched thence ten days before. The reinforcement which he found there was inconsiderable. The royal army was drawing nigh. At one moment he thought of fortifying the town, and hundreds of labourers were summoned to dig trenches and throw up mounds. Then his mind recurred to the plan of marching into Cheshire, a plan which he had rejected as impracticable when he was at Keynsham, and which

* This battle was fought on July 5, 1685, between the Duke of Monmouth and Lords Feversham and Churchill, near Bridgewater, in Somersetshire. The Duke's object was to dethrone King James II.

assuredly was not more practicable now that he was at Bridgewater.

While he was thus wavering between projects equally hopeless, the king's forces came in sight. They consisted of about two thousand five hundred regular troops, and of about fifteen hundred of the Wiltshire militia. Early on the morning of Sunday, the 5th of July, they left Somerton, and pitched their tents that day about three miles from Bridgewater, on the plain of Sedgemoor.

The steeple of the Parish Church of Bridgewater is said to be the loftiest in Somersetshire, and commands a wide view over the surrounding country.

Monmouth, accompanied by some of his officers, went up to the top of the square tower from which the spire ascends, and observed through a telescope the position of the enemy. Beneath him lay a flat expanse, now rich with corn-fields and apple-trees, but then, as its name imports, for the most part a dreary morass. When the rains were heavy, and the Parret and its tributary streams rose above their banks, this tract was often flooded. It was indeed, anciently, part of that great swamp renowned in our early chronicles as having arrested the progress of two successive races of invaders. It had long protected the Celts against the aggressions of the Kings of Wessex; and it had sheltered Alfred from the pursuit of the Danes. In those times this region could be traversed only in boats. It was a vast pool, wherein were scattered many islets of shifting and treacherous soil, overhung with rank jungle, and swarming with deer and wild swine. Even in the days of the Tudors, the traveller whose journey lay from Ilchester to Bridgewater was forced to make a circuit of several *miles* in order to avoid the waters.

When Monmouth looked upon Sedgemoor, it had been partially reclaimed by art, and was intersected by many deep and wide trenches, which in that country are called *rhines*. In the midst of the moor rose, clustering round the towers of churches, a few villages, of which the names seem to indicate that they were once surrounded by waves. In one of these villages, called Weston Zoyland, the royal cavalry lay; and Feversham had fixed his headquarters there.

Many persons still living have seen the daughter of the servant-girl, who waited on him that day at table; and a large dish of Persian ware, which was set before him, is still carefully preserved in the neighbourhood. It is to be observed that the population of Somersetshire does not, like that of the manufacturing districts, consist of emigrants from distant places. It is by no means unusual to find farmers, who cultivate the same land which their ancestors cultivated, when the Plantagenets reigned in England. The Somersetshire traditions are therefore of no small value to a historian.

At a greater distance from Bridgewater lies the village of Middlezoy. In that village and its neighbourhood, the Wiltshire militia were quartered, under the command of Pembroke.

On the open moor, not far from Chedzoy, were encamped several battalions of regular infantry. Monmouth looked gloomily on them. He could not but remember, how a few years before, he had, at the head of a column composed of some of those very men, driven before him in confusion the fierce enthusiasts, who defended Bothwell Bridge. He could distinguish among the hostile ranks that gallant band, which was then called, from the name of its colonel, Dumbarton's regiment, but which has long been known as the first of the line, and which, in

all the four quarters of the world, has nobly supported its early reputation. "I know these men," said Monmouth; "they will fight. If I had but them, all would go well!"

Yet the aspect of the enemy was not altogether discouraging. The three divisions of the royal army lay far apart from one another. There was an appearance of negligence and relaxed discipline in all their movements. It was reported that they were drinking themselves drunk with the Zoyland cider. The incapacity of Feversham, who commanded in chief, was notorious. Even at this momentous crisis he thought only of eating and sleeping. Churchhill was indeed a captain equal to tasks far more arduous than scattering a crowd of ill-armed and ill-trained peasants. But the genius which, at a later period, humbled six marshals of France, was not now in its proper place. Feversham told Churchill little, and gave him no encouragement to offer any suggestions. The lieutenant, conscious of superior abilities and science, impatient of the control of a chief whom he despised, and trembling for the fate of the army, nevertheless preserved his characteristic self-command, and dissembled his feelings so well that his submissive alacrity was praised by Feversham in a report made to the king.

Monmouth, having observed the disposition of the royal forces, and having been apprised of the state in which they were, conceived that a night attack might be attended with success. He resolved to run the hazard, and preparations were instantly made.

The night was not ill suited for such an enterprise. The moon was indeed at the full, and the northern streamers were shining brilliantly; but the marsh fog lay so thick on Sedgemoor, that no object could be discerned there *at the distance of fifty paces.*

The clock struck eleven ; and the duke with his body-guard rode out of the castle. He was not in the frame of mind, which befits one who is about to strike a decisive blow. The very children who pressed to see him pass, observed, and long remembered, that his look was sad and full of evil augury. His army marched by a circuitous path, near six miles in length, towards the royal encampment on Sedgemoor. Part of the route is to this day called War Lane. The foot were led by Monmouth himself. The horse were confided to Grey, in spite of the remonstrances of some who remembered the mishap at Bridport. Orders were given, that strict silence should be preserved, that no drum should be beaten, and no shot fired.

The word, by which the insurgents were to recognise one another in the darkness, was Soho. It had doubtless been selected in allusion to Soho Fields in London, where their leader's palace stood.

At about one in the morning of Monday the sixth of July, the rebels were on the open moor. But between them and the enemy lay three broad rhines filled with water and soft mud. Two of these, called the Black Ditch and the Langmoor Rhine, Monmouth knew that he must pass. But, strange to say, the existence of a trench, called the Bussex Rhine, which immediately covered the royal encampment, had not been mentioned to him by any of his scouts.

The wains which carried the ammunition remained at the entrance of the moor. The horse and foot, in a long narrow column, passed the Black Ditch by a causeway. There was a similar causeway along the Langmoor Rhine ; but the guide, in the fog, missed his way. There was some delay and some tumult before the error could be rectified. At length the passage was effected ; but, in

the confusion, a pistol went off. Some men of the Horse Guards, who were on watch, heard the report, and perceived that a great multitude was advancing through the mist. They fired their carbines and galloped off in different directions to give the alarm. Some hastened to Weston-Zoyland, where the cavalry lay. One trooper spurred to the encampment of the infantry, and cried out vehemently that the enemy was at hand. The drums of Dumbarton's regiment beat to arms; and the men got fast into their ranks. It was time; for Monmouth was already drawing up his army for action. He ordered Grey to lead the way with the cavalry, and followed himself at the head of the infantry. Grey pushed on until his progress was unexpectedly arrested by the Bussex Rhine. On the opposite side of the ditch the king's foot were hastily forming in order of battle.

"For whom are you?" called out an officer of the Foot Guards. "For the king," replied a voice from the ranks of the rebel cavalry. "For which king?" was then demanded. The answer was a shout of "King Monmouth," mingled with the war-cry, which forty years before had been inscribed on the colours of the parliamentary regiments, "God with us." The royal troops instantly fired such a volley of musketry as sent the rebel horse flying in all directions. The world agreed to ascribe this ignominious rout to Grey's pusillanimity, yet it is by no means clear that Churchill would have succeeded better at the head of men, who had never before handled arms on horseback, and whose horses were unused, not only to stand fire, but to obey the rein.

A few minutes after the duke's horse had dispersed themselves over the moor, his infantry came up, running fast, and guided through the gloom by the lighted matches of *Dumbarton's* regiment.

Monmouth was startled by finding, that a broad and profound trench lay between him and the camp, which he had hoped to surprise. The insurgents halted on the edge of the rhine and fired. Part of the royal infantry on the opposite bank returned the fire. During three quarters of an hour the roar of the musketry was incessant. The Somersetshire peasants behaved themselves, as if they had been veteran soldiers, save only that they levelled their pieces too high.

But now the other divisions of the royal army were in motion. The Life Guards and Blues came pricking fast from Weston-Zoyland, and scattered in an instant some of Grey's horse, who had attempted to rally. The fugitives spread a panic among their comrades in the rear, who had charge of the ammunition. Monmouth had hitherto done his part like a stout and able warrior. He had been seen on foot, pike in hand, encouraging his infantry by voice and example; but he was too well acquainted with military affairs not to know, that all was over. His men had lost the advantage which surprise and darkness had given them. They were deserted by the horse and by the ammunition waggons. The king's forces were now united and in good order. Feversham had been awakened by the firing, had got out of bed, had adjusted his cravat, had looked at himself well in the glass, and had come to see what his men were doing. Meanwhile, what was of much more importance, Churchill had rapidly made an entirely new disposition of the royal infantry. The day was about to break. The event of a conflict on an open plain, by broad sunlight, could not be doubtful. Yet Monmouth should have felt that it was not for him to fly, while thousands whom affection for him had hurried to destruction were still *fighting manfully in his cause*. But vain hopes and the

intense love of life prevailed. He saw that if he tarried the royal cavalry would soon be in the rear, and intercept his retreat. He mounted and rode from the field.

Yet his foot, though deserted, made a gallant stand. The Life Guards attacked them on the right, the Blues on the left : but the Somersetshire clowns, with their scythes and the butt end of their muskets, faced the royal horse like old soldiers. Oglethorpe made a vigorous attempt to break them, and was manfully repulsed. Sarsfield, a brave Irish officer, whose name afterwards obtained a melancholy celebrity, charged on the other flank. His men were beaten back. He was himself struck to the ground, and lay for some time as one dead. But the struggle of the hardy rustics could not last. Their powder and ball were spent. Cries were heard of "Ammunition ! for God's sake, ammunition !" But no ammunition was at hand. And now the king's artillery came up. It had been posted half a mile off, on the high road from Weston-Zoyland to Bridgewater. So defective were then the appointments of an English army, that there would have been much difficulty in dragging the great guns to the place where the battle was raging, had not the Bishop of Winchester offered his coach horses and traces for that purpose. This interference of a Christian prelate in a matter of blood has, with strange inconsistency, been condemned by some Whig writers who can see nothing criminal in the conduct of the numerous Puritan ministers, then in arms against the Government. Even when the guns had arrived, there was such a want of gunners that a sergeant of Dumbarton's regiment was forced to take on himself the management of several pieces. The cannon, however, though ill served, brought the engagement to a speedy close. The pikes of the rebel battalions began to shake ; the ranks broke ; the

king's cavalry charged again and bore down everything before them, the king's infantry came pouring across the ditch. Even in that extremity the Mendip miners stood bravely to their arms, and sold their lives dearly. But the rout was in ten minutes complete. Three hundred of the soldiers had been killed or wounded. Of the rebels more than a thousand lay dead on the moor.

So ended the last fight, deserving the name of battle, that has been fought on English ground. The impression left on the simple inhabitants of the neighbourhood was deep and lasting. That impression; indeed, has been frequently renewed. For even in our own time the plough and the spade have not seldom turned up ghastly memorials of the slaughter: skulls and thighbones, and strange weapons made out of the implements of husbandry. Old peasants related very recently, that in their childhood they were accustomed to play on the moor at the fight between King James's men and King Monmouth's men, and that King Monmouth's men always raised the cry of Soho.

Meanwhile Monmouth, accompanied by Grey, by Buyse, and by a few other friends, was flying from the field of battle. At Chedzoy he stopped for a moment to mount a fresh horse and to hide his blue riband and his George. He then hastened towards the Bristol Channel. From the rising ground he saw the flash and the smoke of the last volley fired by his deserted followers. Before six o'clock he was twenty miles from Sedgemoor. Some of his companions advised him to seek refuge in Wales; and this would undoubtedly have been his wisest course. He would have been in Wales long before the news of his defeat was known there; and, in a country so wild and so remote from the seat of government, *he might have remained long undiscovered.* He

determined, however, to push for Hampshire, in the hope that he might lurk in the cabins of deer-stealers among the oaks of the New Forest, till means of conveyance to the Continent could be procured. He therefore, with Grey and the German, turned to the south-east. But the way was beset with dangers. The three fugitives had to traverse a country in which every one already knew the event of the battle, and in which no traveller of suspicious appearance could escape a close scrutiny. They rode on all day, shunning towns and villages. Nor was this so difficult as it may now appear; for men then living, could remember the time when the wild deer ranged freely through a succession of forests, from the banks of the Avon in Wiltshire to the southern coast of Hampshire. At length, on Cranbourne Chase, the strength of the horses failed. They were therefore turned loose. The bridles and saddles were concealed. Monmouth and his friends procured rustic attire, disguised themselves, and proceeded on foot towards the New Forest. They passed the night in the open air; but before morning they were surrounded on every side by toils. Lord Lumley, who lay at Ringwood with a strong body of the Sussex militia, had sent forth parties in every direction. Sir William Portman, with the Somerset militia, had formed a chain of posts from the sea to the northern extremity of Dorset. At five in the morning of the seventh, Grey, who had wandered from his friends, was seized by two of Lumley's scouts. He submitted to his fate with the calmness of one to whom suspense was more intolerable than despair. "Since we landed," he said, "I have not had one comfortable meal or one quiet night." It could hardly be doubted that the chief rebel was not far off. The pursuers redoubled their vigilance and activity. The cottages

scattered over the heathy country, on the boundaries of Dorsetshire and Hampshire, were strictly examined by Lumley ; and the clown, with whom Monmouth had changed clothes, was discovered. Portman came with a strong body of horse and foot to assist in the search. Attention was soon drawn to a place well fitted to shelter fugitives. It was an extensive tract of land separated by an inclosure from the open country, and divided by numerous hedges into small fields. In some of these fields the rye, the pease, and the oats were high enough to conceal a man. Others were overgrown with fern and brambles. A poor woman reported, that she had seen two strangers lurking in this covert. The near prospect of reward animated the zeal of the troops. It was agreed, that every man, who did his duty in the search, should have a share of the promised five thousand pounds. The outer fence was strictly guarded : the space within was examined with indefatigable diligence : and several dogs of quick scent were turned out among the bushes. The day closed before the search could be completed ; but careful watch was kept all night. Thirty times the fugitives returned to look through the outer hedge ; but everywhere they found a sentinel on the alert : once they were seen and fired at ; they then separated and concealed themselves in different hiding-places.

At sunrise the next morning the search recommenced, and Buyse was found. He owned that he had parted from the duke only a few hours before. The corn and copsewood were now beaten with more care than ever. At length a gaunt figure was discovered hidden in a ditch. The pursuers sprang upon their prey. Some of them were about to fire ; but Portman forbade all violence. *The prisoner's dress was that of a shepherd ; his*

beard prematurely grey, was of several days' growth. He trembled greatly and was unable to speak. Even those who had seen him often were at first in doubt whether this were truly the brilliant and graceful Monmouth. His pockets were searched by Portman, and in them were found, among some raw pease gathered in the rage of hunger, a watch, a purse of gold, a small treatise on fortification, an album filled with songs, receipts, prayers, and charms, and the George with which, many years before, King Charles II. had decorated his favourite son. Messengers were instantly despatched to Whitehall with the good news, and with the George as a token that the news was true.

LORD MACAULAY'S *History of England*.

HOW SOME OF OUR NATIONAL RESOURCES ARE WASTED.

DURING the four years ending 1869, the money directly expended upon intoxicating liquors in the United Kingdom amounted to the enormous sum of £450,398,201, being an increase upon the four years ending 1860 of £81,621,107, or £20,405,276 per annum.

"During the same four years (ending 1869), the home consumption of textile fabrics, including cotton, woollen, and linen, was 233,921,000lb. less than it was during the four years ending 1860. Why? For the simple reason that people cannot pour their money down their throats, and put it upon their backs at the same time.

"During the year 1869, the people of this country expended upon intoxicating liquors the sum of £112,885,603, whilst upon cotton goods — our staple

trade—they spent only £8,501,737, or, in other words, we paid £3, 13s. 2½d. per head for drink, and only 6s. 0½d. for our most useful article of clothing. No wonder that so many homes are miserable, and so many people are clad in rags.

“For the manufacture of this enormous quantity of intoxicating liquor, an amount of grain or produce is every year destroyed, equal to 70,000,000 bushels of grain, and if this grain were converted into flour and baked into bread, it would make about 1,000,000,000 4lb. loaves, and would give about 170 loaves yearly to every family of five persons throughout the United Kingdom.

“If we add together the money spent directly upon drink, the cost of pauperism, crime, loss of labour, waste of food, expense of accidents, disease, &c., which result through drink, the total loss to the nation will amount to more than £240,000,000 per annum.

“Notwithstanding our unprecedented facilities for getting wealth, on the 1st of January 1870, there were 1,281,651 persons, whose names were on the books of parish unions as paupers, and if these were multiplied by 3½ in order to get the entire number of applications for relief during the whole of the year, it would give over 4½ million persons who are every year in a state of pauperism, and who are obliged to get assistance from the public, or about one to every seven of the population.

“In the year 1860 there was spent upon drink in the United Kingdom £86,897,683. In that year there were 1,010,158 paupers, and we paid for poor’s and police-rates £9,269,807. In the year 1869 the expenditure on drink had increased to £112,885,603, whilst the number of paupers had increased to 1,281,651; and the amount

paid for poor's and police-rates to £13,511,827 ; or, comparing the latter year with the former, we find that, whilst the expenditure upon drink increased 29 per cent., the number of paupers increased to 25 per cent., and the poor's and police-rates increased 44 per cent.

"If the reader will consider the fact that, in addition to those who become actual paupers, there is a large number of others who are reduced to destitution by habits of intemperance, but who get help from their friends and never trouble the parish, he will be able to form some faint idea of the appalling mischief which results from drunkenness.

"In the United Kingdom there are 98,009 public-houses, 52,590 beershops, besides 35,497 wineshops, &c., making a grand total of 186,096, or about one to every 34 houses.

"These houses originally were established for victualling, and not for tippling. Publicans now obtain permission to sell intoxicating liquors only on condition that they will not adulterate their drinks, that they will not permit drunkenness or disorderly conduct in their houses, &c. ; and yet it is estimated that there are upwards of 600,000 habitual drunkards, who are all, or nearly so, the victims of the public-house.

"Whilst cotton-mills and other manufactories are prohibited (and very properly too) from working more than 60 hours per week, these manufactories of pauperism, crime, &c., are allowed to work upwards of 120 hours ; and, not content with this, they work 8½ hours on Sundays also.

"These facts prove the paralysing influence of the Liquor Traffic upon our industrial resources, and how it *tends to impoverish and pauperise the nation.* The

universal testimony of all who have opportunity to investigate the matter is, that the Liquor Traffic not only paralyses trade and induces pauperism, but that it is also the main source of nearly all the crime, lunacy, and social demoralisation, that exists in our land.

"Our National Resources," by W. HOYLE

"JOIN OUR TEMPERANCE ARMY, BOYS!"

Join the Temperance Army, boys !
'Tis a firm and gallant band.
Led by truth, it seeks to banish
Foul Intemperance from the land.
Stronger than the strongest iron,
Is the drunkard's galling chain ;
Shall he perish, die for ever ?
No ; we'll teach him to abstain.

Join the Temperance Army, boys !
Thro' the world your voices ring ;
Youth is now the time to hasten,
And escape the serpent's sting.
Never mind how men may taunt you
Let them pass unheeded by ;
Better in the right be single,
Than with thousands drink and die.

**INCREASE OF WAGES AND INCREASE OF
DRUNKENNESS.**

THE Rev. W. Caine, Rector of Denton, Manchester, and formerly Chaplain of the county gaol at Salford, read a paper "On the Increase of Drunkenness amongst the Working Classes, and the Causes of it" at a recent meeting of the Social Science Congress. Civilisation, he said, had *two aspects*, and he proceeded to illustrate the

uglier one by citing the quantity of spirits consumed in the United Kingdom in 1873. The consumption of home spirits was nearly 29,000,000 gallons, foreign spirits 10,000,000, and wine 18,000,000; making a total of 57,000,000 gallons, in addition to 1,076,000,000 gallons of beer, and 180,500,000 gallons of British wines and cider. Was, then, the increase of crime, especially in the manufacturing districts, where wages had been high and trade prosperous, really any matter of wonder? Mr Caine quoted the statistics of the Salford county gaol for the five years ending September 1873, and showed that, in spite of all efforts for improvement—social, educational, and religious—the committals for drunkenness in five years had increased 60 per cent. In Manchester, during the year ending March 31, 1873, there were 9150 apprehensions for drunkenness. That this large number was 903 less than the number of arrests in 1872, was doubtless owing to the operation of the Licensing Act in that year, and the consequent earlier closing of public-houses—there being fewer arrests at night, and 467 fewer arrests on Sundays; but the monthly reports of the Chief Constable showed that this number was again increasing. The committals for all offences had also very largely increased, whilst committals of females in five years had increased 60 per cent.

Could there be any greater reproach to Christianity than the increasing habits of drunkenness of English-women? Of 12,420 committals to the Liverpool gaol during the year ending September 1873, 7673 were females. Not in the county of Lancashire only, but throughout all England, judicial statistics showed that drunkenness had greatly increased. The apprehensions for drunkenness in England and Wales in 1872 were

151,000, while in 1873, as stated by Mr Cross in introducing his Licensing Amendment Bill, they were 182,000. This increasing drunkenness Mr Caine attributed to the higher wages of the working classes, the shorter hours of labour, and the increased facilities for obtaining intoxicating drinks ; while to the sale of drink by grocers he attributed the increased tendency to drunkenness among women.

Church of England Temperance Chronicle.

POVERTY, CHARITY, AND DRUNKENNESS.

“THE poor ye have always with you,” and a very “nominal” Christian must he be, who ignores the duty of relieving their wants according to his means and opportunities. Some circumstances, however, have been brought under my notice, which have led me almost to grudge the money given by benevolent people to charitable institutions. It would be well, if statistics could be procured to show how much of the money so kindly given during life, or bequeathed by will, goes to repair the damage done by the selling and drinking of alcohol ; and how much more could be done to relieve the *real* poor and sick if all drunkenness ceased from the land. If we cast our eyes over the long list of institutions for the amelioration of the condition of the poor in this country, we shall scarcely find one which, either directly or indirectly, does not expend a large portion of its revenues in dealing with the sad catalogue of pains and sorrows caused by excessive drinking. I sometimes say to a relative of mine, an honorary surgeon to a large hospital, that were it not for drunkenness, he would have very little practice within its walls. Broken-limbed workmen,

kicked and black-eyed women, diseased and narcotised children, would no longer occupy bed after bed in the vast and too well-filled wards ; and house-surgeons need not to rise from their slumbers to admit and minister to the victims of serious and often fatal midnight "rows."

These wretched drunkards know they can be cared for in hospitals, and kept in poor-houses, when they are no longer able to work, and I fear this may partly account for their utter carelessness for the future. Not for a moment would I wish that these miserable folks should not be succoured in their extremity ; but it is hard on those, who give away their money for real charity, to find so much of it used to remedy the effects of that all-pervading drunkenness, which makes England a proverb among the nations, and which a strong and professedly Christian government ought to be able to deal with in a summary manner. The reason why it is not done may be this : some of the people who make and sell intoxicating drinks become rich, are carried by their wealth into Parliament, and dominate the government. I remember it was said of one candidate, during the last election, that he had made more drunkards than any other man in the large town from which he came. A valued friend of mine told me recently, that she would gladly give her life, if intoxicating drinks could be banished to the shelves of the apothecaries' shops. She has spent, for years, several hours each day in trying to do good among the working people, and she has now come to the unhappy conclusion that every effort, though accompanied with tears and prayers, is almost "labour in vain" and "spending strength for nought." If any one could win over a drunkard, this good woman could, with her bright countenance and sympathetic soul ; but she says the tempta-

tions are too great, and unless they are removed, the people, men and women, will go from bad to worse. Sad, however, as these things are, what would be the result, if all remedial agencies were taken away—if the clergy, Scripture-readers, city-missionaries, Temperance-societies, clothing-clubs, mothers' meetings, and all the great charities before-named, were, for a time, to cease their active exertions? Well, the consequences of "drink," in all their hideous deformity, would take their legitimate course, and then, perhaps, our legislators would be compelled to be less tender of the feelings and pockets of those, who encourage all this mischief.

Church Temperance Chronicle.

A CHAPTER OF FACTS IN REFERENCE TO INTEMPERANCE.

THE capital engaged in the liquor traffic in this kingdom is estimated to be not less than £117,000,000 sterling. The capital engaged in the cotton industry is but £85,000,000, and that in the iron trade £25,000,000; so that the capital in the liquor trade is more than the capital in cotton and iron put together. And this vast capital is not laid out in vain, for in 1872 the money directly spent upon intoxicating liquors in the United Kingdom was £131,601,490. Hundreds of thousands of Englishmen are seeking and gaining subsistence or wealth by a trade which (as the *Edinburgh Review* observer), "in its legitimate exercise, provides but a luxury, and in its illegitimate, the most insidious of all social temptations" It is obvious, that only a limited quantity of intoxicating drink can be consumed in the country without the most

deadly effect on the morals, the health, and the happiness of the people. But, on the other hand, it is clear from the enormous capital engaged in this business, that the pecuniary interest of multitudes would lead them to extend that consumption as much as possible. The great extent and power of the liquor trade is a fact of immense meaning. It is a fact which is influencing the condition of the English people to an untold extent. It may, indeed, be said that brewers, distillers, and publicans are only supplying a demand,—a demand much increased by the present high wages. But, on the other hand, the multiplied supply invites and tempts the demand.

The fearful mortality occasioned by intemperance is not the only evil—it costs the country (United Kingdom), directly and indirectly, £250,000,000. It deluges the land with pauperism, crime, insanity, social and domestic misery; whilst it further blocks the way of educational, religious, moral, and political progress.

We are told that 20 per cent. of the lunatics in our asylums have been drunkards; and that about half of the idiots born in England are the children of drunken parents. The amount of misery therefore inflicted on the children and families of drunkards is incalculable. The drunkard's wife and children suffer far more ills than death itself can inflict; and it is impossible to describe the shame and misery of the husband of a drunken wife and mother.

Place in a row all the public-houses and beer-shops in London, and assuming each to have a frontage of twenty-one feet, they would form a line thirty-five miles in length.

The late Charles Buxton wrote, "The struggle of the school, the library, and the church against the beer-house and the gin-palace is but one development of the war between heaven and hell."

One-fifth of the entire population of the globe are Total Abstainers—a number sufficiently large to show that intoxicating drinks are not necessary to human existence, health, or enjoyment.

Stimulants weaken the reason, while they inflame the passions. They quicken corruption, while they stupify conscience. And I believe—and who does not?—that but for the use of them, thousands would never have taken those first steps in sin which, little by little, have conducted their feet down to ruin.

DR GUTHRIE

THE VALUE OF TEMPERANCE IN RELATION TO HEALTH.

IN the spring of the year 1872, Mr Neison, F.S.S., the eminent actuary, read a paper before the Society of Actuaries. In that paper he stated, that whilst the average mortality of the general population of the country, between the ages of twenty-five and sixty-five, was only fifteen per 1000 living, the average mortality of inn-keepers and hotel-keepers was 26·8 per 1000 living, or more than 75 per cent. above the average mortality of the country.

In contrast to this let us take another class of men altogether. There is an insurance company entitled the Temperance Provident Institution, which, in one department, insures none but persons who abstain from intoxicating liquors, and in another, people who are not wholly Total Abstainers, but who may be taken as the soberer portion of the community, because a drunkard, if known, will not be admitted. This society has been in existence *over thirty years*, and divides its profits every five years.

During the last twenty years, from 1850 to 1870, the division of profits, or the bonuses in the two sections, has been as follows :—

1855.	Temperance Section, from 35 to 75 per cent.
	General Section, from 23 to 50 "
1860.	Temperance Section, from 35 to 86 "
	General Section, from 24 to 59 "
1865.	Temperance Section, from 23 to 56 "
	General Section, from 17 to 52 "
1870.	Temperance Section, from 34 to 84 "
	General Section, from 20 to 49 "

Now, the amount of bonus in any insurance society depends upon the fewness of the deaths, and therefore it is a measure of the mortality. From the above table, therefore, it will be seen that the lives of the Total Abstiners are nearly 50 per cent. better than the lives of the soberer part of the general public. In the case of the inn-keepers the mortality is 75 per cent. in excess of the general rate, whereas in the case of Total Abstiners it is nearly 50 per cent. below it. It is not my wish in any way to disparage any section of the community, but I am bold to say, that there is hardly any class of people in the country, who are kept at such perpetual high pressure speed as are Total Abstiners. They are engaged in business as other men ; and then, apart from business, they are the most active in social, religious, educational, and Temperance work. If high pressure work therefore shortens human life, they of all men ought to be short-lived ; whereas the fact is, at the same ages, they don't die half so fast as the publicans. What is the cause of this vast difference ? It can only be the excessive quantity of alcoholic liquors which the publicans take, and which cuts short their lives.

W. HOYLE.

TESTIMONY OF THE JUDGES AS TO THE CONNECTION BETWEEN CRIME AND DRUNKENNESS.

JUDGE GURNEY declares—"Almost every crime has its origin, more or less, in drinking."

Judge Erskine maintains—"Ninety-nine cases of crime out of every hundred are caused by drinking."

Judge Pattison's Address to the Grand Jury—"If it were not for this drinking, you and I would have nothing to do."

Judge Alderson says—"If all men could be persuaded to abstain from the use of intoxicating drinks, the office of judge would be a sinecure, and the assizes of the country rendered mere nullities."

Judge Wightman says—"Three-fourths of the cases of crime have their origin in public-houses and beer-shops; I find in every calendar that comes before me one unfailing source, directly or indirectly, of most of the crimes that are committed."

Judge Platt declares—"More mischief is done by drunkenness than by any vice in the country—murders, manslaughters, cuttings and woundings, and all sorts of brutalities."

Sir William A'Beckett, Chief Justice of Victoria, says,—"That in nine cases out of ten that have come before me, judicially, in Australia, intoxication or the public-house was, directly or indirectly, the cause."

Judge Coleridge declares—"But for the offences brought on by the excessive use of intoxicating liquors, the courts of justice might nearly be shut up. There is scarcely a crime comes before me that is not, directly or indirectly, caused by *strong drink*."

Judge Williams declares—"All the crime which has filled the Castle (York) is to be traced in some way or other to the habit of drunkenness."

M. D. Hill, Q.C., late Recorder of Birmingham, says—"Whatever step we take, and into whatever direction we may strike, the drink demon starts up before us and blocks the way. The enormous consumption of intoxicating liquors, which prevails through the land, is a source of crime not only more fertile than any other, but than *all* others added together."

Alderman Sir R. W. Carden, Magistrate of London, says—"Nine-tenths of the crime that is committed, and nearly all the poverty and wretchedness of the poor man's dwelling, may be attributed to *drink*."

Church Temperance Chronicle.

FIRST PRINCIPLES OF CHURCH TEMPERANCE WORK.

BY THE REV. H. J. ELLISON, M.A.,

Honorary Canon of Christ Church and Vicar of Windsor.

THE time is not yet come, when Church Temperance workers can keep to their work and leave their principles to speak for themselves. Again and again they have explained them, and put them, as they had thought, beyond the reach of misapprehension; again and again they find them attacked, and the old misconception urged against them, just as if no word had previously been written or spoken upon the subject. All the mistakes, all the extravagances, which can be raked together from the general history of the Temperance movement, are brought into view, and from these a theory is constructed

which the designer has no difficulty in demolishing to his own complete satisfaction.

Fortunately for the perseverance of those of us who have put our hands to this plough, the subject, so far as we are concerned, has long since been lifted out of the domain of theory into that of simple Christian experience. Either the work is from above, or it is from beneath. We look to the results of the work, then, as they lie everywhere around us. We see men who were once raging demoniacs, now clothed and in their right minds, sitting at the feet of Jesus. We see women and children, who were the helpless victims of a worse than African slavery, tasting all the sweets of purified Christian homes. We have stood over the graves of many of those, who had been thus "brought from darkness to light, and the power of Satan to God," and without a shadow of misgiving from their once degraded lives, we have offered the prayer that "we may rest in Him as our hope is this our brother doth." And with the evidence of fact thus before us, we are content to adopt, with a slight paraphrase, the words of the blind man whom our Lord had healed: One thing I know, whereas they were in bondage, now they are free ;—since the world began, was it ever known that Satan cast out Satan, or that the strong man armed was ever dispossessed except by the "stronger than he?"

Before proceeding to give a series of sketches of the lives of some of those now dead who, in my own parish, have been rescued from the destroyer through the agency of the Temperance Society, confining myself to those who have given the plainest evidence in their lives of genuine conversion to God, let me lay down once more, in short outline, the principles on which Church Temperance work has been from the first conducted.

I. *Total Abstinence for the Drunkard.*—This is not enjoined upon him on the ground that all intoxicating drinks are unlawful. We leave this question where we found it, in abeyance. Assuming that there is a "wine which maketh glad the heart of man," it is for those who, under the shelter of the generic name, speak of the whole class of intoxicants as "good creatures of God," to make good their assertion. But whether they can do so or not—whether they can show that the wines of English consumption, fortified, we are now told, with thirty or forty per cent. of "proof spirit"—therefore, clearly "mixed wines" (Prov. xxiii. 30)—and, in addition to these, strong ale, porter, distilled spirits, such as gin, brandy, whisky, robur, arrack, bhang, and absinthe,—are part of man's heritage when God made him "upright," and not some of "the many inventions" which he has "sought out" for himself,—all this is a separate issue, to be tried on separate and independent grounds. It is enough for us that, on the extreme supposition that all were "lawful," as beverages that is, "all things are not expedient." And for the drunkard the inexpediency has been abundantly proved by the simple physical fact, that he cannot take the smallest quantity without going on to excess. The drink itself, to him at all events, has become the cause of offence, which is carrying him, body and soul, into "everlasting fire;" it is the "right hand" which, if he would enter the kingdom of God, he must, without hesitation or delay, absolutely "cut off."

II. *The Pledge.*—This is not with us a solemn "vow" or "oath," or any such thing. We leave the question of lawfulness of vows, again, untouched. The Pledge in our societies is simply, as regards the man himself, the record of a resolution, made in dependence on the

God, that he will abstain from that, which is
him. If, through the weakness of his fallen
breaks this resolution, he is not taught that
committed a still more unpardonable sin, and so
spair ; he is urged to lay his fall where
of Christian people, whose spirit-
y different from his, are daily laying
of Christ, with earnest prayer for
length in time to come, and with the assurance,
has only to persevere in that course to obtain
final victory. As regards his fellows, the Pledge is
a token of mutual agreement. He has been ruined in
time past by association in drinking customs ; he needs
now the power of association to help him in his newly-
formed resolution of Abstinence. He finds it in the
Temperance Society.

III. *The part assigned to the Pledge in his ultimate restoration.*—No single part which properly belongs to the Gospel of our Lord Jesus Christ. But the Gospel must not be credited with powers to which it never lays claim. It never claims to remove the stumbling-block from the sinner's path. It preaches repentance, urging him by every consideration to put the cause of offence away from his own path, and then promises him all needful help for the final victory. The Pledge of Total Abstinence in the Temperance Society is the drunkard's first answer to this. It is the flocking together of the frightened sheep, in the first moment of their terror, when they have come to see that the wolf is upon them, and when they are looking to every quarter for help. It is for the shepherd of the flock to lay hold of them there, and draw them into the fold of Christ. The Temperance Society, rightly viewed, is the recruiting-ground for our ranks, as the drinking-houses have become the recruiting-ground.

for Satan. It is when the evil spirit has lost for the time the advantage over the man, which the drink gave him, when for the time he is in his right mind, that we can tell him of the Good Shepherd, and lead him on, step by step, till, in the persevering use of the appointed means of grace, he can realise in his own person the blessed truth, "Stronger is He that is in you than he that is in the world." The Pledge of Abstinence has been the door through which he was admitted to the Master's presence; but all his salvation from first to last will have been through Him *alone*.

IV. *The ground on which the Temperate may be asked to join such a Society.*—Not again as a necessary duty. We have no commandment to assign for such a step. Nor as a measure of asceticism, as though there were anything meritorious in renouncing this or that indulgence. But solely on the ground of expediency in the face of a great "*present distress*," and this expediency to be judged of by every man for himself. Claiming the liberty to "abstain" for ourselves, we recognise the same right of Christian liberty in our brother-men; we have no word of condemnation, no pharisaic assertion of superiority for our own practice, if he walks by a different rule. But we invite him nevertheless, the young first, and above all in view of the kind of temptation to which he will be exposed, to grow up in ignorance of the taste, generally an acquired one, for intoxicants; and other Christian men and women to come and take part with us in fighting the Lord's battle against our national sin. We urge our brethren to "stand fast in the liberty wherewith Christ has made them free," and therefore, have always said, "Let no man judge you in respect of meat or drink." But we do not forget that the great master of Christian casuistry, who wrote these words, also

said "Only use not this liberty for an occasion of the flesh, but by love to serve one another;" and recollecting also that he went on to say, "Take heed lest this liberty of yours become an occasion of stumbling to them that are weak," we have no hesitation in pleading with them by the most constraining of all motives, "love," for the *weak* member of Christ, growing out of "love" for the Lord Himself, to do *their* part in taking this stumbling-block out of a brother's way.

INTEMPERANCE AND SOME OF ITS RESULTS.

No one is more familiar, and therefore no one more competent, to speak of the fearful evils of intemperance than those noble men and women who make it the one duty and pleasure of their lives to visit the masses of our working people in their dark and too often wretched homes. They see, without deception, what are the real causes of poverty, pauperism, and misery, and when traced to their source find that, in nine cases out of ten, indulgence in strong drink is at the bottom of the mischief. The following cases narrated by a lady, who has for years been labouring for the poor, will fully substantiate the truth of these remarks.

CASE No. 1.—The husband died in the winter, finally, of consumption, but brought on by drink. He was a first-class compositor, and the poor wife's expression to me was, "We might have had a good house of our own now, with all the money he has wasted." She is a good, patient, superior woman, and no one knows what her sufferings have been from his ill-treatment. She is now in permanent ill-health, owing to it and the nervousness caused by *listening* for his return in a state of violence.

I attribute the temptation in this case partly to the almost absolute necessity to resort to the public-house, as the only place of refreshment open to those who work nightly at the printing of a morning paper. In another instance, the wife tells me her husband, though finishing his work at four in the morning, is often not home till eight, being tempted to sit and drink with companions in a warm, cheerful public-house; and she laments his having gone to this office as the beginning of their ruin. Probably his case is one of many. The widow and her five children first mentioned are now dependent on parish relief, one boy only earning sufficient for his support.

CASE No. 2.—Another case is of a widow and six children. The man died last July, also of consumption, arising, no doubt, from the same cause. He was once in the Foresters' Club, but failed to pay up, and at his death had no benefit. Once he was waiter at a music-hall, and was tempted to drink; then long out of work—when he got it, became too ill, and struggled on for months. His family are now left to parish relief, and friends (shopmates) buried him. He was once regular at church, and could not have become all at once an habitual drunkard.

CASE No. 3.—A couple lately came into the parish, to an empty room, without one article of furniture, yet the husband was a strong man, a bricklayer by trade. I traced their history, being referred to the clergyman they had known at Stepney, who had them in his parish fifteen years ago. He was then a master employer, and besides this had a legacy left him, which was spent chiefly in drink. All this he confesses. He says he "was happy, leading a good life, once," as he expresses it, "walking with God." "No one knows," he says, "the depths of misery he has passed through."

It would be endless to relate all the cases even within the knowledge of one person in one parish. There is one, a landlady, just dying, and apparently most respectable, whose illness was caused by brandy and gin. There is a good-looking young woman, with a husband in good work, and no family, who was picked up by the mission-woman on Easter Monday morning, with her head cut. There is a young couple with an infant, who every Saturday night are the torment of some decent people in the same house, from sitting up to drink and riot. There is a man helpless in paralysis, unable for years to do a day's work, from drink. Another, in good work, who spends all but a few shillings at the public-house, the poor wife having to sit from morning till night at some ill-paid employment to make up his deficiencies and gain bread for her children; the consequence of which is, the home is in a state of neglect, and dirt, and confusion, that is sad to see; and yet it is impossible to blame her for it.

Surely, if every one who feels the greatness of these evils were to do something to counteract them, we might reasonably look for a result. The heavy poor-rates, of which this intemperance is the main cause, might alone rouse all to try to abate the prevalence of it, if no thought of the awful sin could do so, apart from its temporal results. But for this source of misery, there would be only pleasure and satisfaction in helping the cases of sickness and sorrow that would remain; while at present the greater part of our work amongst the poor consists in vain endeavours to repair and patch up the troubles which, in the past, may be traced to causes almost wholly preventible.

Church Temperance Chronicle.

CAPITAL AND WAGES.

WHAT is a capitalist? He is supposed to be a sort of monster or ogre in some of the fancy pictures, which have been drawn. But, in fact, a capitalist is only a man who has saved money, or whose forefathers or friends have saved. John Brown, the carpenter, has deposited £20 in the village savings bank, and to that extent he is a capitalist. William Thompson has nearly paid for the cottage in which he lives, by subscribing to a building society, and he too is a capitalist. Every mechanic, who has a good chest of tools, possesses a certain amount of capital. This is, in truth, only the savings from past industry, but it becomes the helper of future industry. Many of the richest men at the present day, or their fathers before them, began life with nothing beyond their own strong hands, clear heads, and willing hearts. Instead of wasting money, and time, and health, they worked hard and saved money; and in due season the reward was reaped. The money thus saved is not left to lie idle and useless. It is turned to account in many ways, and it helps to make more money. Mere coins form but a small part of the capital of civilised communities. Indeed, coins are only signs of wealth, and their use is to enable us the more easily to make exchanges. All that a man possesses forms his capital, whether it be clothes, tools, houses, land, mills, ships, flocks and herds, barns, stacks of corn or hay, or the rough materials which he makes into something different and better. Thus the farmer's seed, manures, animals, ploughs, harrows, growing crops, &c., are his capital. The manufacturer's buildings, looms, machinery, wool, cotton, &c., are his capital. The capital of the merchant and of the shopkeeper is the stock in trade

with which they deal. Capital is always changing its nature and value. Thus, in the progress of society, vast sums are every year invested in railways, canals, manufactures, and in various great works. When any of these are about to be made, persons having property, whether it be little or much, are asked to subscribe or to lend money, for which interest is paid. As soon as the work is finished, if it be wisely or properly done, and for a needed purpose, it begins to yield a return in the shape of profit, which forms the reward of those whose money helped to make it.

Every careful workman is really helping to increase the capital of the country. The rough iron ore, dug up far below the surface of the ground, becomes worth more and more as it is smelted, and refined, and worked up into engines, or machines, or tools. The cost of this labour bestowed upon it adds to its value. A country carpenter, who has in his shop fifty pounds' worth of wood and fifty pounds' worth of tools, can make the wood much more valuable by working it up into doors, or window-frames, or furniture, with the use of the tools which he has learnt to handle with skill and industry ; but if he wastes one or two days every week, and squanders his money at the public-house or at races and fairs, he cannot expect to get on, but he will become poorer, and will probably have to work as a common labourer for others, and may end his days in the parish-house. So it is with nations. If property be wasted in wars, or if a great and terrible fire destroys it, the capital of the country is lessened by so much, and resources are scattered which had been collected by the toil of many people. Not only is it one person, or one family, or one village, or even one district that suffers, but the whole country *suffers in some way*. Every idle, useless person, and

every spendthrift, is a drag upon the rest, who really have to support such persons. But a man who works hard, lives steadily, and saves money, which he puts out to interest, or with which he buys land and houses to bring him in rent, or uses it to enlarge his business and make it more profitable, is doing good not only to himself, but to his fellows. Money thus saved, whether it be in the form of pounds, shillings, and pence, or in the form of buildings, or of raw material, or of live stock, is the real wealth of the country.

Thus capital helps to make more capital. It is really the savings of past industry, and it forms the fund out of which wages are paid. While the fields are being ploughed, dressed, sown, and reaped, the labourers must eat, and be clothed, and find lodging. While a costly piece of machinery is being made, or while a large ship is being built, several months, or even a whole year, may pass by, during which the workmen must live. In a great factory, where cotton, or wool, or silk is being prepared or woven, the workers cannot wait until the articles are finished and sold before they receive the money for their labour. All these want their share of the profit, called "wages," at once, before any profit is made, and when it is impossible to say if there will be any profit. After the farmer has paid wages, and bought his implements and seed, and met all the expenses of his farm, blight or drought may ruin the harvest; in which case he does not even get back his bare outlay. After the costly piece of machinery has been put together, and after the large ship has been built, these may prove to be unsound or they may have to be sold at a loss. The fabrics made in the factories may lie for weeks and months *unsold*, and when sold they may fetch little more than *the cost* of the materials and the price of the labour. But

during this time the workers engaged upon these various things have all been paid their wages out of capital, which, as has been said, is only the savings of former years. Without it they could not live, for they cannot afford to wait until a market is found for the fruits of their labour. The larger the amount of savings, therefore, the better it is for the workman, because out of these savings his wages are paid, until such time as the work done can be turned into money or what is equal to money. Workmen really depend upon capital for their welfare ; and the best means they can use to increase their own resources is to favour the increase of capital, so that the fund out of which their wages are paid may keep pace with the growth of their own numbers.

*Extract from "CAPITAL AND WAGES," by the
Society for Promoting Christian Knowledge.*

THE ALBERT MEDAL.

THE Queen has been graciously pleased to confer the "Albert Medal of the Second Class" on Mr David Webster, late second mate of the bark *Arracan*, of Greenock, residing at Broughty Ferry, Dundee. The following is an account of the services in respect of which the decoration has been conferred :—

"The *Arracan*, while on a voyage from Shields to Bombay, with a cargo of coals, took fire from spontaneous combustion of her cargo, and on the 17th of February was abandoned by her crew, who then took to their boats and endeavoured to make for the Maldivé Islands. The boats kept company until the 20th, when, finding the currents too strong, it was agreed to separate after dividing the provisions. The master in command of

the long boat then made for Cochin, the mate in charge of the gig, and the second mate, Mr David Webster, in charge of the pinnace, with four of the crew—viz, three men and one boy—made for the Maldiv Islands. After two days Mr David Webster's boat was injured by a heavy sea, and could not keep up with the gig, and lost sight of her. From this time the pinnace was kept working to windward until the 9th of March, by which day the provisions and water had been consumed. Shortly afterwards the crew cast lots which of them should be first killed to be eaten, and the lot fell upon the ship's boy Horner, but Webster, who had been asleep, was awake in time to save the boy's life. After dark an attempt was made to kill Webster himself, but the boy Horner awoke him in time to save himself. On the following day, Webster having fallen asleep, was awake by the struggles of the crew for the possession of his gun, with which to shoot him. Two hours later the crew attempted to take Horner's life again, but were prevented by the determined conduct of Webster, who threatened to shoot and throw overboard the first man who laid hands on the boy. The next day one of the crew attempted to sink the boat, but Webster mastered him and prevented further mischief. Two days later the same member of the crew again tried to sink the boat, and expressed his determination to take the boy's life. For this he would have been shot by Webster had not the cap on the gun missed fire. Soon after, putting a fresh cap on his gun, a bird flew over the boat, which Webster shot; it was at once seized and devoured by the crew, even to the bones and feathers. During the next five days the crew were quieter, subsisting on barnacles which attached themselves to the bottom of the boat, and on sea blubber, for which they dived.

The following day some of the men became delirious. One of them lay down exhausted, when another struck him several blows on the head with an iron belaying pin, cutting him badly. The blood which flowed was caught in a tin and drunk by the man himself and the two other men. Afterwards they fought and bit one another, and only left off when completely exhausted, to recommence as soon as they were able, the boy Horner during the time keeping watch with Webster. On the 31st day in the boat they were picked up 600 miles from land by the ship *City of Manchester*, Hardie, master, by whom they were very kindly treated and brought to Calcutta. Webster, by his conduct, was the means of saving the lives of all in the boat.

From the "London Gazette" of July 10, 1874.

THE EVACUATION OF VERDUN.

AT a very early hour in the morning the town was awakened by the drums and bugles of the Prussians, and by the rumbling of the baggage waggons, which started well ahead of the troops.

At seven o'clock sharp the various Prussian corps mustered on their respective *places d'armés*, from which they marched up to the esplanade and the citadel, and the manner, in which in that comparatively narrow space such a large force came up by successive detachments at very short intervals, took their places and formed themselves into close columns of battalions, not only without a hitch, but without a moment's pause, was simply admirable. At a quarter to eight precisely the Brigadier General, Baron Von Linzingen, arrived, and at five minutes precisely General Von Manteuffel came up with

his staff. There was no salute on the part of the troops when he came up. He merely walked round the outer lines, and then, placing himself right in front, he drew his sword, and gave the word of command, "Present arms. Hurrah, for God, our King and country. Hurrah." Right heartily did he utter that cheer. The troops echoed it back, the bands struck up the Prussian National Anthem, the same as our own, played rather faster; the officers waved their swords, and altogether the scene was one, which no one could witness without being deeply stirred. No one, who did witness it, could possibly ever retain the absurd belief, which still prevails in this deluded country, that the machine-like precision of Prussian drill and the strictness of Prussian discipline excludes enthusiasm. Very few of the population turned out to witness this imposing sight, but even they were deeply impressed by it. I have seen many reviews and military pageants. I have seen far larger forces assembled in France, but I never beheld a spectacle more stirring—or one better calculated to make the looker-on understand that curious combination of enthusiasm and discipline, which makes Prussia so formidable, by reconciling every able-bodied man to the hardships of military service.

The royal salute once over, the General took up his station at the head of the road down which the troops were to travel to the Porte Chaussée, out of which they were to march on their homeward route. They all marched past in that wonderful order, which no French troops seem able to attain, with their bands playing. The people looked on, but uttered no shout, word, or cry of any kind. Nothing, in short, could be more orderly or dignified than the attitude of the population. The column of march was headed by a battalion of

infantry, then came two batteries of sixteen pounders, then three companies of Vertungs artillery ; these were followed by a company of engineers, then the bulk of the infantry ; afterwards a squadron of Uhlans, the generals, and Manteuffel last of all bringing up the rear. General Manteuffel has acquired claims on the gratitude of the French by making the burthens of the occupation as easy to bear as his duty would allow him ; but he is not a young man, nor a handsome man, and the crowd audibly whispered unpleasant remarks about his personal appearance. As he, the hindmost man of the column, passed down the street, a window opened on either side, and the moment he had gone by, a tricolour flag was stuck out of each casement, and so that by the time he had got to the Porte Chaussée, if he had turned round, he could have seen the whole of the long street, down which he and his troops had filed off, was a perfect maze of tricolours. Almost before the Prussians were out of the town, the national standard was hoisted on the main tower and on the spire of the Cathedral, and the town was "dressed up" as by magic. There is no house, no casement, without its flag ; strings and festoons of tricolours decked the houses on the Meuse ; many men donned tricoloured cravats ; all the women stuck tricoloured cockades in their hair, or wore them on their bosom ; and one enterprising poulterer in the Rue St Lambert actually exhibited in his shop a live hen fastened down in a basket, with the tricolour fastened in some mysterious way to its head.

After decorating their windows, the Verdunois hurriedly breakfasted, and flocked down *en masse* to the railway station, to the Porte de France, and to the ramparts looking eastward, to await the arrival of the French troops.

The train conveying the troops came in at 11.50.

The men were in third-class carriages. On an open van in front there were half a dozen of them singing. They got out and formed in the station. The 94th Regiment being formed out of the wreck of the 1st Regiment of Grenadiers of the Imperial Guard, may be considered a crack corps. The men are taller than the average of French linesmen, and they have many old soldiers among them. They got out of the train very smartly, considering the insanely heavy weight they had to carry on their knapsacks. It is true that they had been travelling all night, but their movements lacked that smartness and precision, which the Prussians had displayed in the morning. In exactly one hour and twenty minutes the Prussians had mustered, assembled, paraded, saluted, and marched out of the town. It took a full hour for the 734 men and 37 officers of the 94th of the French line to get out of their carriages and march up to the citadel; the men were all seasoned soldiers—it was no fault of theirs but the fault of the system, and it is very clear that the system is wrong. Many Frenchmen among the bystanders were struck by the contrast, and made no scruple of saying so, but they were a small and select minority.

A great crowd lined the rampart, and all the way, up to the citadel, was lined by all the population, which had not found room at the station or on the glacis. They gave the troops a right hearty reception, and they did not spoil it with party cries, as has been the case in other towns. It was perfectly evident that the people at Verdun, who have seen what war is, were very deeply moved at seeing the old flag and the old uniform again; and that very deep current of feeling imparted a kind of solemnity to the entry of the French, which it is hard to find words to describe.

The Times, Sept. 1873.

SOME INCIDENTS

OF CAPTAIN (AFTERWARDS SIR JOHN) FRANKLIN'S OVER-
LAND JOURNEY FROM HOOD'S RIVER TO YORK
FACTORY IN 1820.

PART I.

IN attempting to cross the river, they could not but lament the loss of their best canoe. St Germain, the interpreter, Captain Franklin and Belanger, a Canadian voyager, embarked in the small remaining one, when the breeze being fresh, it was driven to the brink of the rapid. Belanger applied his paddle to prevent the canoe from being forced into it, but he lost his balance, and the canoe was upset. They kept hold of it, however, till they touched a rock, on which they managed to keep their footing till the water was emptied. Belanger then held the canoe steady while St Germain put Captain Franklin into it, and got into it himself; Belanger they were forced to leave upon the rock; the canoe dashed down the rapid, struck, and was again emptied, but at last they got safe to shore.

Meanwhile, Belanger, standing up to his middle in a freezing rapid, his body covered with wet clothes, roared out for help. St Germain tried to get him into the canoe, but in vain, it was again hurried down the rapid. Adam next tried, but could not succeed. They then made a line out of slings, but it did not reach him. Belanger was nearly exhausted, when the canoe was luckily got near enough to throw to him a small cord, by which they dragged him, perfectly senseless, through the rapid. He was instantly stripped, rolled up in blankets, and, by Dr Richardson's orders, two men

undressed themselves, and lay by him in the bed, but it was long before warmth could be restored in him. It would be difficult to describe the anxiety that Captain Franklin had experienced during the unsuccessful attempts to relieve Belanger. Every time the canoe was put out it dashed furiously down the rapid, and he lost sight of it among the rocky islets. Once he thought he saw it buried in the waves ; and the sad fate of all his brave companions, forced to wander about the coast of the lake, rushed upon his mind. His own fate would have been decided ; for he was alone on the opposite side of the river, without gun, hatchet, or ammunition, unable even to light a fire, or relieve himself from his wet clothes.

Belanger was soon tolerably well again, and the recollection of this accident was lost in new evils ; among these hunger was the most acute, *tripe de roche** and pieces of singed hide being considered a capital meal. Snow fell in showers, and their blankets scarcely kept them warm. When they encamped at night, they lighted a fire to thaw their frozen shoes and put dry ones on ; then they wrote their journals and prepared their supper. They ate it in the dark and then lay down, keeping up cheerful conversation, until the warmth of the blankets had thawed their bodies, so as to enable them to sleep. When they had no fire they lay down in their wet clothes, for fear they should freeze so hard as to prevent their being able to wear them the next morning.

Having resumed their march they again reached a part of the Coppermine River. The loss of their canoe was now felt, and the more so that neither a ford nor

* A kind of glutinous moss which is found adhering to the rocks.

wood for a raft could be found. Mr Back and the hunters were again sent forward with some hopes of meeting the Indians and getting assistance from them.

The remaining party were with some difficulty collected, and cheered by finding a putrid deer, on which they breakfasted. They set to work to make a raft of willows, but the willows were green, and when finished, it had so little buoyancy that one man only could be supported on it. It might, however, suffice to transport the party, if a line could be conveyed to the opposite shore, and Belanger and Benoit, two of the strongest Canadians of the party, tried to do this, but they failed for want of oars. Every plan was attempted, and at last Dr Richardson said he would swim across the stream with the line, and haul the raft over. He plunged in with the line round his waist, but had not swam long before his arms were so benumbed with cold, that he could not move them; he then turned upon his back, and had nearly reached the shore, when his legs too got benumbed, and he began to sink. His terrified companions therefore pulled the line, and dragged him back again almost lifeless. They rolled him in blankets and placed him before a good fire; fortunately he was able just to speak, and tell them how he ought to be treated. Towards evening he was able to converse a little, and they removed him into the tent. He had lost the sense of feeling on one side, and when stripped, even the Canadians shuddered at the skeleton form which appeared before them.

It was his being so dreadfully thin and starved, that caused the cold water to take so terrible an effect upon him. What increased the pain he suffered, was, that as he was getting into the water, he trod upon a dagger,

and cut his foot to the bone, but this did not stop him in his brave attempt.

The canoe being at last finished, the whole party was transported one by one across the river, and Mr Back, with three of the Canadians, again went in search of the Indians. The rest of the party, after eating the remains of their old shoes and scraps of leather, set off over a range of black hills. The *tripe de roche* disagreeing with Cr dit and Vaillant, these men were weaker than the others, and news was brought to the party in advance, that they could proceed no further. Dr Richardson turned back and found them lying in different places in a pitiable condition ; they fell down whenever they attempted to move, and when some of the stronger men were entreated to go and carry them, they positively refused ; and even threatened to lay down their loads, and make the best of their way to Fort Enterprise.

After consulting what was to be done, it was agreed that Dr Richardson and Mr Hood should remain behind with Hepburn to assist Cr dit and Vaillant if they should survive, and that Captain Franklin with his party should go in search of the Indians, or on to Fort Enterprise, and send succour as soon as any could be obtained. With a heavy heart Captain Franklin took leave of his brother officers.

The snow was very deep, and before the party had proceeded many miles, they were forced to encamp. After passing the night in a wretched condition, two of the men were utterly unable to proceed, and were sent back to Dr Richardson. Two more were shortly after seized with dizziness, and Captain Franklin was compelled to continue his way with only four of the Canadians, Adam, Peltier, Benoit, and Samandie.

PART II.

After a most toilsome journey, Captain Franklin and his party arrived in a state of excessive weariness at Fort Enterprise, where, alas, no trace of human beings could be found! No Indians, no provisions; in short they had been utterly neglected. Akaitcho, the Indian chief who had engaged to store up food for them at the fort, had broken his promise, and on entering this miserable abode, where they had hoped to find rest and succour, they all burst into tears; the melancholy fate of their poor companions behind, rushing into their minds.

They found indeed a note from Mr Back, saying, that finding no provisions, he had gone on with his party to Fort Providence, but that the weak state they were all in, rendered it very probable that none of them might live to reach it.

Thus abandoned, they set to work to collect skins and *tripe de roche* for supper, and some wood which they pulled up from the floor, made them an excellent fire.

Benoit being sent on in company with one of Mr Back's men who had returned to search for the Indians, the party at the fort was reduced to four. Two of these, Adam and Samandie, were unable to stir, so that Peltier and Captain Franklin had to share the fatigue of collecting the wood, pounding the bones and preparing the two meals, which Captain Franklin insisted they should eat every day.

The *tripe de roche* now became almost too much frozen to be gathered, and the strength of the party declined daily. When they had sat down they could scarcely rise again. Their mouths becoming sore from eating the bone soup, they left it off and made soup of the skin instead of frying it. Peltier, the strongest among them,

was now almost unable to fetch wood. One day they heard the sound of voices, "Ah, the Indians!" they cried with joy; but alas! no, it was Dr Richardson and Hepburn, each carrying his bundle. Both parties were shocked at each other's thin skeleton faces and hollow voices. Dr Richardson entreated the others to look and speak more cheerfully, little thinking that his own appearance was quite as melancholy. Hepburn had brought a partridge, which they warmed at the fire, tore into six parts and swallowed ravenously. Dr Richardson then gave a sad account of their companions. He and Hepburn were the sole survivors of the party. Mr Hood had been shot either by accident or intentionally by one of the Canadians.

They now all put forth their remaining strength to provide food. Samandie and Peltier grew daily worse, and were soon too ill to eat even what food could be got for them. In the course of a few days they both died. Their companions removed their bodies to a distant part of the house, but they were not strong enough to carry them out or to bury them. This loss of their brothers in misfortune was a great shock to all the survivors, and their spirits were very low. Their stock of bones was now finished, and the fatigue of taking the hair off the skin to prepare it for making soup, was now too great for any of them. The hardness of the floor, which was only covered when they slept by a blanket, caused great soreness to their skeleton bodies; but even in the midst of these hardships, they could generally enjoy three or four hours' sleep at night, and strange to say, their dreams were always about the pleasure of feasting. In proportion as they lost their bodily strength, they lost the power of directing their minds. They were pettish and irritable with each other without cause. Hepburn

cried out, "If we do ever reach England I wonder if we shall recover the use of our understandings."

At last Adam appeared dying ; Captain Franklin was employed in cheering him, and Dr Richardson and Hepburn were cutting wood, when a musket shot was heard, and three Indians came up to the house. The two officers knelt down and returned thanks to Heaven for their deliverance. Adam tried to get up, but fell back. The Indians had been sent by Mr Back, and brought some dried deers' meat and tongues. Captain Franklin, Dr Richardson, and Hepburn, famished as they were, ate voraciously and of course suffered dreadfully, and had no rest all night. Adam could not feed himself, and was therefore better off. The Indians gave him small pieces at a time and would not let him eat too much. One Indian was then dispatched to Mr Back to request him to send more food at once, and the other two remained to take care of the party. These kind creatures never rested till they had made the travellers somewhat comfortable. They buried the dead bodies, cleared the room of its dirt, kept up cheerful fires and persuaded the Englishmen to wash and shave themselves. In the course of a few days, Captain Franklin and his party recovered sufficient strength to continue their journey as far as the chief's camp, aided by the tender care of the Indians, who fed them like children, cooked for them and prepared their encampment. The reception of the party at Akaitcho's camp was very striking ; they were looked at with compassion and in solemn silence, for a quarter of an hour, as a mark of condolence. Their old friend the chief would not suffer a word to be spoken till they had tasted food. He cooked for them himself, which in general he would have considered as very *unbecoming his dignity*. The next day every Indian in

the tribe came to see them and to show his pity for what they had suffered.

As soon as they had sufficiently recovered strength, Captain Franklin and Dr Richardson travelled in carioles to Moose-deer Island, where they were joined by Mr Back, and where, surrounded by kind friends, they gradually regained their health, so that by the return of spring they were able to walk. In May, they embarked for Fort Chepewyan, and from thence proceeded to York Factory, which they reached in safety after a journey of more than five thousand miles.

Northern Regions.

SIR ALEXANDER BURNES.

SKETCHES FROM THE LIFE OF AN INDIAN HERO.

PART I.

ENTERING upon the last year of the last century, a youth from the Scotch burgh of Montrose, who had gone up to London to seek his fortune, wrote to his mother saying, "I have passed many a serious hour, reflecting on weighing, examining minutely the advantages and disadvantages which are likely to follow my conduct in the different plans proposed, and I find the result in favour of going to India on the establishment.¹ Perhaps my wishes to obtain that situation have biassed my judgment, and prevented me from seeing every circumstance as it ought to have been seen ; so I will say little more on the subject, except to inform you of what distresses me greatly, *i.e.*, the uncertainty of succeeding as I could wish." The letter from which this extract is taken is

¹ In the service of the East India Company.

signed, "your loving and affectionate son, JOSEPH HUME."

Twenty years afterwards, the writer who had been thus doubtful of his power to obtain an appointment in the Indian establishment for himself was able to obtain appointments for others. He had become a man of great influence in his native town. He had gone out to India poor, and he had returned rich, whilst still in the very prime of his life. He had returned to take a distinguished part in public affairs, to represent his native town in the great Imperial Parliament, and to do for it and its people all the good that lay in his power.

The success of Joseph Hume was a great encouragement to the youth of Montrose. He had taken his first start from a humble beginning, and he had risen solely by the force of his own personal energy. Might not others do the same?

Many were encouraged and aided in this attempt; among others Alexander Burnes. He was the fourth son of the provost, or chief magistrate, of Montrose, and was greatly respected by the towns-people for his integrity and ability.

Alexander was a clever, in some respects, perhaps, a precocious boy; and at fifteen, had learned as much in the way of classics and mathematics, as most promising striplings of his age. He had read too some books of history, and a few of the master-pieces of English poetry. He belonged to a debating society, and was not altogether unskilled in disputation. Like other high-spirited boys, he had taken part in conflicts of a more dangerous character than mere conflicts of words, and had fought some hard battles with the boys of the town. Altogether he was a youth of high spirit and good promise, and had *in him some of the stuff* of which heroes are made.

Through the kindness of Mr Hume, Alexander obtained a cadetship of infantry on the establishment of Bombay ; he spent two months in London, studying under the well-known Oriental professor, Dr Gilchrist, and on his sixteenth birthday, May 16, 1821, he attended at the India House, and formally took the oath of allegiance, and on the 21st of the October following he and his eldest brother (who had sailed with him) found themselves on the beach of Bombay, with very little money in their pockets, and with very slender interest to help them onwards, but with stout hearts, clear heads, and a determination to make for themselves careers in the public service.

On November 19th, he recorded in his journal that he had "commenced his military career," and appeared on parade. From that day he made steady progress in his profession. He applied himself sedulously to the cultivation of the native languages. He had continued on board ship the studies which he had commenced under Dr Gilchrist in London, and now he supplemented his literary pursuits by making, and steadily adhering to, the rule, to converse with his native servants only in Hindostanee ; and on the 8th of December, he wrote thus in his journal, "Having emigrated from my own country, and being rather of a curious and searching disposition, I have begun to gain as much information as possible concerning the manners, customs, laws, and religions of this people—a study not only amusing and interesting, but highly instructive ; for what is it that makes a man but a knowledge of men and manners?" There was nothing that a man might not achieve in India, who thus set himself to work in the right way. He persevered in his studies, and in the following May went up for an examination in Hindostanee, and found

that he had passed for an interpretership. "I was so delighted," he wrote, "that I could hardly contain myself."

His regiment was ordered to Poonah, and here he began the study of the Persian language, because he had been told that it would greatly improve his Hindostanee, and perhaps add greatly to his future prospects in India ; and he prosecuted the study with such great effect that after a few months he was able to derive intense gratification from the perusal of the Persian poets, whose compositions he declared to be for "sound and everything like a beautiful song."

In January 1823, Alexander Burnes was gazetted as Interpreter to the 1st Extra Battalion, and some months later, when little more than eighteen years old, the regimental adjutancy was offered to him, with a salary of fifty to sixty guineas a month. The offer excited him greatly, and he wrote :—"Behold your son Alexander the most fortunate man on earth for his years !"

From this time his progress was rapid, his knowledge of Persian brought him under the notice of the Government, and obtained for him the post of Persian interpreter to an army of 3000 men ; this force did not advance, and in the absence of other duty Alexander employed his time in surveying and geography ; and produced a map of an unknown track, for which he was rewarded by a good appointment. He afterwards volunteered to explore the Indus, then almost unknown, and this delighted the men in authority ; and in the autumn of 1829 he started upon this hazardous undertaking, but was recalled for political reasons ; in the two following years he executed with success this "delicate and hazardous duty ;" and on his return the Governor-General, Lord William Bentinck, received the young traveller with characteristic

kindness, and listened with the deepest interest to the account of his adventures.

PART II.

After a few weeks of pleasant sojourning in the vice-regal court, Alexander Burnes started upon a still longer and more hazardous journey, an exploration which was eventually to obtain for him fame and fortune; the design being to cross the Indus and Indian Caucasus, and proceed through Cabool and Independent Tartary, to the countries bordering on the Oxus and Caspian. In the middle of March 1832, the travellers forded the Indus, near Attock, took leave of their Sikh friends, and became guests of the Afghans. From the Afghan capital Burnes wrote on May 10th to his mother:—

“My journey has been more prosperous than my most sanguine expectations could have anticipated; and instead of jealousy and suspicion, we have hitherto been feasted and caressed by the chiefs of the country. I thought Peshawur a delightful place till I came to Cabool; truly this is a Paradise. . . . We travel from hence in ten days with a caravan, and shall reach Bokhara on the 1st July. . . . If the road from Bokhara to the Caspian is interrupted by war, of which there is a chance, I shall be obliged to pass into Persia. . . The countries north of the Oxus are at present in a tranquil state, and I do not despair of reaching Istamboul in safety. They may seize me and sell me for a slave, but no one will attack me for my riches. Never was there a more humble being seen. I have no tent, no chair or table, no bed, and my clothes altogether amount to the value of one pound sterling. You would disown your son, if you saw him. My dress is purely Asiatic, and since I came from Cabool, has been changed to that of the lowest

orders of the people. My head is shaved of its brown locks, and my beard dyed black grieves, as the Persian poets have it, for the departed beauty of youth. I now eat my meals with my hands, and greasy digits they are, though I must say in justification, that I wash before and after meals. . . . I frequently sleep under a tree, but if a villager will take compassion on me, I enter his house. I never conceal that I am a European, and I have as yet found the character advantageous to my comfort. I might assume all the habits and religion of the Mohammedans since I can now speak Persian as my own language, but I should have less liberty and less enjoyment in an assumed garb. The people know me by the name of Sekundur, which is the Persian for Alexander, and a magnanimous name it is. With all my assumed poverty I have a bag of ducats round my waist, and bills for as much money as I choose to draw. I gird my loins and put on my sword on all occasions, though I freely admit I would make more use of silver and gold than of cold steel. When I go into a company I put my hand on my heart, and say with all humility to the master of the house, 'Peace be unto thee,' according to custom, and then I squat myself down on the ground. This familiarity has given me an insight into the character of the people, which I never otherwise could have acquired. I tell them about steam-engines, armies, ships, medicine, and all the wonders of Europe; and in return they enlighten me regarding the customs of their country, its history, state, factions, trade, &c., I all the time appearing indifferent.

"The people of the country are kind-hearted and hospitable. They have no prejudice against a Christian, and none against our nation. . . . At present I am living with a most *amiable* man, a nawab named Jubulur Khan,

brother to the chief of Cabool, and he feeds me and my companion daily. Our breakfast consists of pillau (rice and meat), vegetables, stews, and preserves, and finishes with fruit, of which there is yet abundance, though it is ten months old. Apples, pears, quinces, and even melons, are preserved, and as for the grapes they are delicious. They are kept in small boxes in cotton, and are preserved throughout the year. I am well mounted on a good horse, in case I should find it necessary to take to my heels. My whole baggage on earth goes on one mule, over which my servant sits super-cargo ; and with all this long enumeration of my condition, and the entire sacrifice of all the comforts of civilised life, I never was in better spirits. . . . I cannot tell you how my heart leaps to see all the trees and plants of my native land growing around me in this country."

Of their host Jubulur Khan, Burnes writes, "I never took leave of an Asiatic with more regret than I left this worthy man. He seemed to live for every one but himself. He was known afterwards among our people as "the Good Nawab," and the humanity of his nature was conspicuous to the last.

The travellers now continued their journey, and traversed the stupendous range of the Hindoo Koosh or Indian Caucasus. At Bokhara they received from the Vizier all possible kindness and hospitality. "Sekundur," he said to Burnes on his departure, "I have sent for you to ask if any one has molested you in this city, or taken money from you in my name, and if you leave us contented."

From Bokhara the route of the travellers lay across the great Turkoman desert, thence to the shore of the Caspian, returning by way of Teheran, from which point they moved down the Persian Gulf, took ship

there for Bombay, and afterwards proceeded to Calcutta.

At Calcutta Alexander Burnes laid before the Governor-General an account of his journey, and was sent home to communicate to the authorities in England the information which he had obtained. All this was truly delightful. Never in the midst of his wanderings in strange places and among strange people, had he forgotten the old home in Montrose, and the familiar faces of the household there; never had his heart ceased to yearn for the renewal in the flesh of those dear old family associations. He liked India, he loved his work, he gloried in the career before him; but the good home feeling was ever fresh in his heart, and he was continually thinking of what would be said and thought at Montrose.

In London he was received with acclamations, in fact, as he himself said, "I am killed with honours and kindness." The magnates of the land were contending for the privilege of a little conversation with "Bokhara Burnes." And to crown all, the king—William IV.—commanded the presence of the Bombay Lieutenant at the Brighton Pavilion, and listened to the story of his travels and the exposition of his views for nearly an hour and a half.

Thus did the young soldier and traveller return to his home after an absence of twelve years.

From Kaye's "INDIAN HEROES."



PART II.



DISTRIBUTION OF LAND.

IF we take a glance at a map of the world, or examine an artificial globe, we are at once struck with the preponderance of water upon the earth's surface. Out of a total area of nearly two hundred million square miles, fifty-two millions, or about one-fourth only, is occupied by land. Of this land, again, three-fourths lie to the north of the equator. This is in itself a curious fact, but it is not all. Almost the *whole* of the land is really grouped on one side of the globe, so that not more than one twenty-seventh part has land opposed to it on the opposite side. If in an artificial globe we take Falmouth as a centre, we find that it is the pole of a hemisphere which contains forty-nine millions out of the fifty-two million square miles of land ; Falmouth may, therefore, be taken as the centre of the terrestrial ¹ hemisphere of the globe : and a point in New Zealand is the centre of the aqueous ² hemisphere.

Various theories have been propounded from time to time, in order to explain this preponderance of land in one hemisphere ; and if this had been a constant fact in the history of the globe, some explanation might fairly have been looked for. But the present distribution of land and water is, if we may so term it, merely accidental. *It is doubtless the most suitable in the present period of*

the earth's history, but it has not always been the same. In the vast changes which produced the geological systems, the distribution of land has altered over and over again. It is probable, that at no previous period was it ever identically the same as now, and in succeeding ages it may possibly be again changed.

It is easy to conceive, that when land is raised above the sea, it will probably be of less density than when pressed down by a weight of superincumbent³ water. By the very act of upheaval it would be torn into fissures and rendered cavernous; and consequently, there is no need to have recourse to theories which suppose that the centre of gravity does not coincide with the centre of the earth's mass, or that the rocks which form the bed of the ocean are rendered more heavy by the presence of numerous metallic veins.

If we now consider the forms of the great land-masses, we are struck with the fact, that they are all more or less triangular in shape; and if we descend to details, we see the same idea carried out in the peninsulas which fringe the borders of the northern continents. Another curious fact is, that most of the peninsulas, in whatever part of the world we meet with them, point to the south.

The great land-masses may be grouped into two sets of three each: the northern continents, embracing Asia, Europe, and North America; and the southern continents, embracing South America, Australia, and Africa. Looking merely at the outline of these continents, we find the northern continents differing from the southern masses in two or three important particulars. The northern continents are all much indented; each terminates in the south in three projections; and each has an archipelago⁴ of islands attached to

it. In Asia we have the three peninsulas of Further India, Hindostan, and Arabia, with the East India Archipelago. In Europe we have the peninsulas of Greece, Italy, and Spain, with the Grecian Archipelago. In North America we have the peninsula of California, the isthmus of Panama, and the peninsula of Florida with the West India Islands.

A deeply indented coast-line has a material effect upon the geography of a country or continent. The climate is brought under the influence of the surrounding body of water, and is thus rendered moist and equable. There are facilities for harbours and sea ports, and thus commercial activity is developed; while, on a large scale, deep indentations in a coast, by causing corresponding peninsulas and projections, tend to individualise the geography of a continent: to break up its monotony, to promote the establishment of separate nationalities, and thus to cause emulation in arts, to encourage exchange, and to advance civilisation. Viewing the subject in this light, it is important to notice the comparative length of coast in individual continents. In Asia there is one mile of coast to 528 square miles of surface; in Europe there is one mile to 187 square miles: in North America, the average is one mile of coast to 266 square miles of area. In the southern continents the length of coast is comparatively smaller. In South America, it is one mile to 440 square miles; in Africa one mile to 738 square miles of surface: in Australia, one mile to 340 square miles of country.

The southern continents, therefore, as a whole, are remarkable for their compact outlines, and for the absence of numerous indentations. They differ from the northern continents also in the fact that they terminate towards the south in one point, instead of three;

and that each has a large island near its southern extremity. Thus, Tierra del Fuego lies at the extremity of South America; Madagascar, near the southern point of Africa; and Van Diemen's Land, at the southern extremity of Australia. It has also been remarked that each of the southern continents is distinguished by having a large bulge or deep bend in its western side: it is sufficient to mention the Gulf of Guinea, the Australian Bight, and the large bend on the west side of South America. "*Text-Book of Physical Geography*,"
by WM. LAWSON.

1. TERRESTRIAL, earthly. *Terrestrial hemisphere*, a half sphere composed almost entirely of land. (Lat. *terra*, the earth.)

2. AQUEOUS, watery. *Aqueous hemisphere*, a half sphere composed almost entirely of water. (Lat. *aqua*, water.)

3. SUPERINCUMBENT, lying above. (Lat. *super*, above, and *cum*, to lie down.)

4. ARCHIPELAGO, a sea abounding with small islands. The word literally means *chief sea*, and was the name given by the Greeks to the sea lying between their own country and Asia Minor; this sea was studded with islands; hence our present use of the word archipelago, which is now frequently applied to islands themselves when clustered thickly together.

SPRINGS, RIVERS, LAKES.

Of the total quantity of water which falls upon the earth in the form of snow or rain, a portion is carried off by rivers into the sea, another portion is evaporated and carried back into the atmosphere; the remainder sinks into the ground. This portion is not lost, it circulates through the crust of the earth, in some parts forming pools, in others, underground rivers. These rivers differ from streams on the earth's surface, for they sometimes sink to great depths, and then rise again through hydraulic¹ pressure. When water reappears again at the

surface through some natural channels, it forms a spring. *Springs* are of two kinds—cold, and thermal or hot, springs. Cold springs, again, may be either surface or deep-seated. When the bed of rock—using the term in its geological sense—is perfectly open and pervious² to water, like sand or gravel, and rests upon some impervious rock, such as a bed of clay, the rain-water soaks through the sand or gravel, and collects in pools on the impervious stratum. If a hole be dug then through the upper strata, water will rise to a certain height, much in the same way as sea-water filtrates into any hollow which we dig in the sands at low tide. Such surface-springs are very common on the sides of hills or mountains, especially where the upper strata consists of chalk, sand, or other permeable substances. The supply of such springs depends almost directly upon the rainfall of the immediate district, and therefore they often entirely cease during a long drought. Deep-seated springs are such as depend for their supply upon water, which has sunk to a great depth, and has then again risen to the surface. Their nature is illustrated by the formation of an *Artesian Well*. When a pervious stratum lies between two impervious strata, the water absorbed along the line of outcrop collects in pools. If now a boring is made through the upper impervious stratum, the water will rush up to find its level. Such wells are called *Artesian*, from the town of Artois, where such borings attracted attention during the Middle Ages. There are many such wells in the neighbourhood of London, some of them of considerable depth. A celebrated experiment of this kind was tried at Grenelle, in the suburbs of Paris, in 1834, when a depth of 1600 feet was reached without finding water; when the boring-rod had descended to 1800 feet, water, with a temperature

of 82°, rushed up in great quantities. Now if, instead of this artificial channel, the water had found an outlet through some fissure in the upper impervious bed, it would have formed a deep-seated spring. At Tours, in 1830, a well was sunk, and when the water rushed up, it brought a great quantity of fine sand, shells, seeds, and other vegetable matter, and it was thought from the nature of the shells and vegetable remains, that the water had come from the valleys of Auvergne 150 miles distant. In some cases, small fish, with perfect eyes, unlike those found in underground channels, have been brought up alive. These facts seem to suggest the idea that leaky beds of rivers are often the feeders of springs; and it is very probable that the ocean itself supplies large quantities of water to the underground circulation.

*Intermittent*³ *springs* are common, and occur under various circumstances. On the banks of the Thames, between Richmond and London, the wells regularly ebb and flow with the tide, owing to the porous nature of the river's banks, which are alternately saturated and drained by the tide. In other cases, the intermission may arise from the fact that the spring issues from an opening in the side of a reservoir fed from above. If the supply be not equal to the waste, the water will sink below the opening, and the spring will stop until the reservoir be replenished. Or, if the opening happen to form a natural syphon,⁴ the discharge will continue until the cavity is empty, and then cease until the water once more reaches the highest point of the curved channel through which it issues.

Thermal springs, in many instances, derive their temperature from the depth to which their water has descended; this was the case with the water which

issued from the Artesian Well at Grenelle; and that experiment seemed to fix the increase of temperature at the rate of 1° Fahrenheit for every 60 feet of descent. In many instances, however, hot springs seem to be connected with centres of volcanic disturbances. During the earthquake of Lisbon the temperature of a spring called *La Source de la Reine* (the Queen's spring), at Bagnères de Luchon, in the Pyrenees, was suddenly raised as much as 70° , or changed from a cold spring to one of 122° Fahrenheit, a heat which it has since retained. Indeed, it may be accepted as a general truth, that in regions where volcanic eruptions still occur, hot springs are abundant, and occasionally attain a boiling temperature: while in proportion as we recede from such centres of igneous⁵ activity, the thermal waters decrease in frequency and average heat.

Geysers. The most striking phenomena connected with boiling springs may be seen in the geysers of Iceland. They occur in the south-western district of the island, where nearly 100 of them are said to break out in a circuit of two miles. The great geyser rises out of a spacious basin at the top of a circular mound, composed of siliceous incrustations deposited from the spray of the water. The basin is about fifty feet in diameter, and four feet deep, terminating downward in a smooth pipe eight or ten feet in diameter. The water in the pipe appears to be in a constant state of ebullition.⁶ It rises and gradually fills both the pipe and the basin. Subterranean noises are then heard, the ground is shaken slightly, and a column of water is thrown up with loud explosions, to the height of 100 or 200 feet. After playing for a while like a fountain, and giving off great clouds of vapour, the pipe is emptied, and a column of steam rushing up with amazing force finishes the eruption. Few of

the geysers play longer than five or six minutes at a time, though sometimes half an hour.

“*Physical Geography*, by W. LAWSON.”

1. HYDRAULIC, relating to water in motion. (Gr. *hydōr*, water.)
2. PERVIOUS, that which can be penetrated; lit., *affording a way through*. (Lat. *per*, through, and *via*, a way.)
3. INTERMITTENT, ceasing at intervals; lit., *going between*. (Lat. *mitto*, to cause to go.)
4. SIPHON, a bent tube for drawing off liquids from one vessel into another.
5. IGNEOUS, pertaining to, consisting of, or like fire. (Lat. *ignis*, fire.)
6. EBULLITION, the act of boiling. (Lat. *bullio*, to boil.)

WINDS.

VAPOUR is continually rising from all parts of the earth's surface, and mingles in an invisible form with the atmosphere. Now as dry air is 40 per cent. heavier than the same volume of vapour at the same temperature, it follows that the varying amount of this vapour in the air must have a marked effect upon the rise and fall of the column of mercury in the barometer. The amount of aqueous vapour in the atmosphere attains its maximum¹ at or near the hottest part of the day, and its minimum² at or near the coldest. On the other hand, as heat expands the air and cold condenses it, the density of the atmosphere will be greatest about midnight, and least about noon. The result of these causes, when combined, is that there are two maxima and two minima heights of the barometer every twenty-four hours. Within the tropics where these variations are very regular, the mercury attains its greatest height at

nine or half-past nine in the morning: it then sinks till four in the afternoon, after which it again rises and attains a second maximum at half-past ten or eleven in the evening. It then begins to fall, and reaches its second minimum about four in the morning. These variations are very slight, scarcely exceeding the one-tenth of an inch in the whole day, but the change is so regular in the tropics that, according to Humboldt, the time of day may be inferred from the height of the barometer with considerable approach to accuracy.

We have stated that heat expands the air and makes it lighter, while cold condenses it and makes it heavier. Now, it is the property of all fluids to preserve a state of equilibrium, and one of the chief conditions of the equilibrium of the atmosphere is, that every stratum should be of the same density. If therefore, the air in any particular locality becomes rarefied^s, the denser air in the vicinity will flow in to restore equilibrium, and a wind is produced. This may be illustrated by the phenomena of the land and sea breezes which are experienced on the sea-coast in every part of the world. Land is heated more readily than water, but cools more rapidly. During the day, therefore, the land is warmer than the sea, and the atmosphere which is above the land partakes of its higher temperature. The colder air from off the sea therefore rushes in to restore equilibrium, and a sea breeze is felt. After sunset, the land cools more rapidly than the water, the atmosphere over the land is chilled, and becomes heavier than that of the sea, and a land breeze begins to blow, and continues till both atmospheres become of the same density.

The trade-winds, which prevail within the tropics, are produced in a similar manner. The equatorial parts of the globe *being the hottest*, the atmosphere there is more

rarefied than in other regions, and there is a strong ascending current, the air seeking a stratum of its own density. The colder air from the poles flows in to produce equilibrium, and two polar currents are thus produced. Were the earth at rest these currents would blow directly from north to south, but the rotation of the earth upon its axis causes them to partake of an easterly direction, for the earth, turning from west to east, carries the atmosphere along with it. A particle of air, therefore, at the equator, moves with the earth at the rate of about 1000 miles in an hour, while a particle near the pole has little or no movement whatever. A current of air, therefore, which comes from the poles to the tropics, moves from west to east more slowly than the earth does. It is therefore left behind, and appears to move in an opposite direction from east to west. Thus, instead of coming directly from either pole, the winds blow from the north-east and south-west respectively: and the nearer they approach the tropics the more easterly they become, until at length their course is almost due east, where they are known as trade winds. The polar winds necessitate return winds, otherwise there would be soon a vacuum⁴ at the poles. These return winds are supplied by the ascending current which is constantly rising within the tropics. At first these winds are upper currents, but as they recede from the equator they become chilled by the decrease in temperature: they therefore become heavier, and just outside the tropics begin to be felt as surface winds. These winds are also affected by the earth's rotation; for starting, with a rapid motion from west to east, they pass over regions where the motion to the east is less and less rapid, and thus the excess of their easterly movement is felt, and instead of blowing directly from the equator to the poles

they are felt as south-west and north-east winds, according as they blow over the northern or southern hemisphere.

There is thus a complete circulation of air from the poles to the equator, and back again to the poles : and this circulation we find has an important bearing upon the climate of the globe, by transferring the warmth of the tropics to the regions of cold, and the moisture of the southern ocean to the rivers of the north.

“*Physical Geography*,” by WM. LAWSON.

1. MAXIMUM, the greatest. The plural of this word is *maxima*. (Lat. superlative of *magnus*, great.)
2. MINIMUM, the least. The plural of this word is *minima*. (Lat. *minimus*, superlative of *parvus*, small.)
3. RAREFIED, made thin or rare, less dense. (Lat. *rarus*, rare, and *facio*, to make.)
4. VACUUM, a vacant or empty space. (Lat. *vacuus*, empty.)

THE COLOUR OF THE SEA.

THE colour of the open sea is a deep blue, passing into a green as the water becomes shallower. It is probable that blue is the natural colour of pure water, but this hue is modified¹ by particles of matter held in solution, and sometimes by the nature of the bed. The depth of the blue in the water of the ocean seems to depend on the quantity of salt it contains. Hence the deep azure of the Mediterranean Sea and the indigo blue of the Gulf Stream and the trade-wind region. The light green, or olive colour, of the waters of the Polar Ocean, may be partly owing, on the other hand, to the less proportion of salt in them. In the Red Sea, the Vermillion Sea, and off the mouth of La Plata, the water is coloured by the infusoria² it contains. The sea is white in the Gulf of Guinea, dark purple in the Black Sea, green in

the Persian Gulf, and yellow on the coast of China. The waters of the Yellow Sea are discoloured by the mud brought down by the great Chinese rivers. What causes the black or dark purple of the Black Sea is not known. The colour of clear shallow water depends upon the bottom ; over white sand it is green ; brown or black over a dark ground ; and grey over mud.

1. MODIFY, to change the form of, to vary. (Lat. *modus*, a measure.)

2. INFUSORIA, microscopic animals inhabiting infusions, or water containing decaying matter. (Lat. *fundo*, to pour.)

CRUST OF THE EARTH.

FORMATION OF STRATIFIED AND UNSTRATIFIED ROCKS.

THE outer surface of the earth is composed of *soil*, as gravel, sand, clay, &c., also of *rocks* of various kinds. And these soils, rocks, and other materials, form what is called the *crust of the earth*, for they occupy so small a space as compared to the whole body of the earth, that the space so occupied may justly be likened to the crust of a pie or a loaf ; nevertheless this *crust* is the only part of the earth that we are able properly to examine ; for to the centre of our globe no man has ever yet penetrated ; as the deepest mines, are, so to speak, only scratches upon the surface, and the centre is probably a liquid mass of burning minerals, but of this we cannot speak positively.

It is different, however, with the *crust of the earth* ; that can be examined, and the parts of which it is composed can be inspected and classified.

The soil which lies upon the surface is chiefly composed of powdered rocks, softened and decomposed by

the action of the elements, mingled with bits of clay, sand, gravel, and other mineral, vegetable, and animal deposits. This soil affords nourishment to all vegetable life, it varies much in its nature, and is generally the richest in those spots where the waters of a river have, for a long series of years, added to it liquid mud and other fertilising ingredients. The soil is generally the poorest and least productive on high lands, whence the wind and the rain have carried its higher particles, and in some spots there is no soil at all to cover the rocky skeleton of the earth. Then even the most ignorant persons can see, that the rocks so exposed to their sight differ one from the other.

In some places they are red, and afford a beautiful contrast to the green trees and grass ; in others they are dazzlingly white, white enough to make your eyes ache on a sunny day. Again they are seen grey, almost black, dark-blue, and variegated.

But greater even than their variety of colour is their variety of form.

Some rocks lie parallel to each other, that is, in separate masses or layers of different thickness, one above the other, and are then called *stratified*, each layer being called a bed or *stratum*. These *strata* may possess the same chemical qualities, or may be totally different, but however this may be, the rocks if found in layers are called *stratified*.

In some of the cliffs on the English coast the stratified rocks may be seen lying one above another just like the leaves of a book. Stratified rocks are generally found in a settled order, and thus miners, engineers, &c., are enabled, on seeing one section of land, to judge what order of stratification they will find in another, and sink *shafts or make roads* accordingly. Of course this only

applies to certain districts, as sometimes one or more class of rocks is entirely wanting.

The parallel strata are seldom found horizontal or level with the eye, but decline or *dip* in some direction, north, south, east, or west. All the strata in a district commonly dip in the same direction. Sometimes the angle is very slight, sometimes it is acute. Occasionally the strata is found to be suddenly disturbed, and displaced in order and position : this is called a *fault*. The stratified rocks are not the same in every country or part of a country, and do not universally follow each other in the same order, but even when one or two kinds are absent, they generally preserve a certain order and regularity.

All rocks that do not lie thus in order one above the other, are called *unstratified*. These either occur in solitary peaks among the strata, or more thickly in mountainous countries.

Rocks have all been formed by the action of fire or water, and the former are called *igneous*, and the latter *aqueous*.

The aqueous rocks were formed in the beds of lakes, mouths of rivers, arms of the sea, or under the sea itself; and consist of different sediments deposited in horizontal layers, each pressed and hardened by those above it.

The igneous rocks were formed in volcanic regions, and are the result of eruptions of melted minerals, mud, lava, ashes, &c.

So we see that the stratified rocks were formed by the action of water in long past ages. That the deposits were at first horizontal, and have received their present *dip* from an earthquake or other revolution of the earth's surface. It is in these rocks that we find animal and vegetable remains ; such as fossils of fish, shells, &c., all

such things as might be found in the bed of a river or sea at the present time.

But unstratified rocks are the result of fire ; of violent volcanic eruptions of internal heat, thousands and thousands of years ago ; they contain metals, crystals, and other mineral treasures, but no animal or vegetable deposits.

F. E. B.

CLOUDS,

THE WATER-CARRIERS OF THE EARTH.

CLOUDS are condensed vapour, suspended upon, and floating in, the air. They float in the air, because they are lighter than the air, and when they become too heavy for the air to support they fall in rain.

You are probably aware that the air or atmosphere surrounds our earth to the height of nearly fifty miles, and that its pressure is heaviest when close to the earth, and lighter when at a considerable distance from it. You will therefore easily perceive, that the smallest and lightest clouds are those, which move in the upper strata of air : such clouds seldom fall in rain, but when they enter a warmer strata of air, are generally absorbed by it and held in solution, re-forming again from time to time. The lightest clouds are called *cirrus-clouds*, from a Latin word signifying *curl*, for these clouds most frequently resemble a lock of wavy hair ; but their forms are very diverse, sometimes stretching across the sky in parallel threads, sometimes joining together and forming the "mares' tails," which sailors consider a sign of rising wind, or again covering a great part of the sky with light fleecy feather-like masses, which, when coloured by the sun on one side, are perhaps the loveliest of all clouds.

In this state they are thought by country-people to resemble the scales of a fish, and are called "mackerel-back skies."

So light and bright and changing are the cirrus-clouds, that they dazzle the eye of the beholder, and it is with difficulty that they can be accurately observed: such clouds spring into being by thousands on a summer evening. When the atmosphere, which has been greatly heated all day, becomes somewhat cooler, then the moisture, which it has absorbed, becomes too heavy for it to keep any longer in solution, and the particles of water draw toward each other, and become for the first time visible, being cirrus-clouds. The sun sinks lower, and the atmosphere becomes still cooler. It can no longer keep invisible the moisture, which it has absorbed; that near the surface of the earth, falls again to the earth as *dew*; while in the higher regions of the air it adds to the number of the cirrus-clouds, which, on a cool evening succeeding a hot day, become very numerous.

When many cirrus-clouds are driven by the winds into a cold current of air, they immediately become larger by the addition of other particles of moisture, which the warm air had absorbed, but which the cold air cannot retain; these congregate together and are piled one above the other, hence the name given to them *cumulus*, or *heaped* clouds. These are the clouds that we see lying along the horizon, their white summits glittering in the sunlight, like the tops of snowy mountains. The *cumulus* clouds float in a lower strata than the cirrus, especially in the morning and evening, when the air is cool, but at noon they frequently rise high, supported by the hot air, or driven by rising currents of wind. The softly rounded masses of *cumulus* resemble in shape the cloud of steam, which rises from the boiler of an engine.

Some clouds combine the forms of these two, and are then called *cirro-cumulus*; sometimes these are so light as to permit the sun and moon rays to penetrate them, and are then most beautifully tinted, particularly towards sunset.

The light misty clouds, which sometimes overspread the whole sky with a thin gauzy vapour, through which the sun and moon are scarcely visible, are called *cirro-stratus*; these clouds are generally thin but of great length, and sometimes appear in broad stripes rather denser in the centre. These two varieties of cirrus-cloud rise sometimes to a great height.

Now we come to the *nimbus* or true rain cloud. This has no special form, but has a uniform dark grey tint, is very heavy with half-formed drops of rain, and hangs low in the atmosphere. It is composed of some or all of the clouds already mentioned, but so blended together that no distinction is visible. These nimbus-clouds sometimes increase to a great thickness, and look like solid masses; they then assume a very dark hue; but when they begin to dissolve in rain the colour returns to a uniform grey.

The true thunder-cloud is a combination of all these, and is called *cumulo-stratus*. This consists of heavy piled masses of cloud, round and streaked, dark and ominous, heaped upon each other in gigantic masses, carried hither and thither with great fury by the wind, and sometimes by the force of electricity against the wind; such clouds are charged with strong electric currents, and when they meet, a thunderstorm is the result.

No one can deny, that clouds are very beautiful, but their use exceeds their beauty. They are the water-carriers of the earth, which, taking up their stores from the oceans and other great masses of water, carry them

away on the wings of the wind to refresh the thirsty earth. Travelling through the air with great and varying speed, they reach the continents, and the wind drives them towards the great mountains, whose sides, being always colder than the sheltered plains below and often capped with snow, radiate cold air from their summits. In this cold air the cloud can no longer float, the particles, of which it is formed, become condensed into drops, and the rain falls to feed the countless rivulets and brooks, which uniting flow down in broad, life-giving streams to the sea, carrying fertility and beauty in their train.

Thus you perceive, that most rain falls on the tops of mountains and in hilly countries, and this will account for the magnificent water supply of America, which is fed by clouds evaporated from the immense surface of the Pacific Ocean, and attracted by the lofty mountains of the west coast, which stand as barriers in their path. And thus, too, we can understand the rainless condition of great part of Africa, which has no great mountains to attract the clouds. Central Asia too is rainless, for the clouds cannot pass the barrier-mountains north and south of it.

F. E. B.

CORAL ISLANDS.

MOST of the islands within the tropics are either volcanic or coralline. The reef-building coral is very like a bush or plant. It grows up from the bottom of the sea, and spreads out branches. At the end of each branch there is the appearance of a flower. This is the mouth, which is surrounded by a hair-like fringe, by means of which the polype collects its food. The solid part of the coral

is the skeleton, outside of which there is in some instances a jelly-like skin, which is the soft part of the animal. When the coral-animal dies, the skin decays and drops off, while the skeleton remains. In coral districts, thousands are at work on one spot, and when any die others take their places, thus in time a large reef is built up, the interstices between the branches of coral being filled up with sand, shells, and fragments of coral broken off by the force of the waves. The corals go on building until the reef reaches the surface of the water, when they die. Gradually a thin soil is formed by the action of the waves; a seed is dropped by some passing bird, or a cocoa-nut comes floating on the sea, and vegetation springs up: thus gradually the reef is formed into an island.

Coral formations are of four kinds:—

1. The *fringing reef*, where the reef is near the shore.
2. The *barrier reef*, which is some distance from the shore, but only partially surrounds an island.
3. The *encircling reef*, a ring of coral with an island in the centre.
4. An *atoll*, a ring of coral with a lagoon in the centre.

Fringing reefs are common in the Atlantic, Indian, and Pacific Oceans, and examples may be seen in the West Indies and off the east coast of Madagascar. The finest example of a *barrier reef* is found off the N.E. coast of Australia. It extends for a length of over 1000 miles, with a breadth varying from 200 yards to a mile, and at an average distance of from 20 to 30 miles from the shore, increasing in some places to 60 and even 70 miles. The depth of the water between the barrier and the shore is navigable throughout; and there are openings in the reef, through which ships can enter. This

away on the wings of the wind water, but its
 earth. Travelling through the surf. The long
 ing speed, they reach the corals, lifts itself up in
 them towards the great water, and, curling
 always colder than the cataracts of white foam,
 capped with snow, roar like deep thunder.
 In this cold air form a ring round moun-
 particles, of which distance of from two to three miles
 drops, and the on the outside from a great depth,
 and brooks, in the land by a channel two or three
 giving stress deep. We have a fine example in Tahiti,
 in their of the Society group.

There are numerous in the Pacific Ocean ; the largest
 moun are 40 to 90 miles in their longest diameter,
 for they enclose lagoons from 15 to 49 fathoms
 deep. In almost every instance, an atoll contains an
 opening on the leeward side through which vessels may
 enter and find shelter. This fact, coupled with the
 circular form of these islands, at first led to the belief,
 that those coral formations were built upon the craters
 of submarine volcanoes ; but this theory would plainly
 not account for the formation of fringing and encircling
 reefs, or of such a vast structure as the great barrier-reef
 of Australia. The theory, therefore, proposed by Mr
 Darwin, is now generally accepted. Having noticed that
 the coral reefs extend often to unknown depths, and
 knowing the reef-building corals rarely live at a depth
 exceeding 20 fathoms (120 feet) he was irresistibly led
 to the conclusion, that a great part of the bed of the
 South Pacific must be gradually subsiding.

This fact seems to explain at once the various coral
 formations. In the first place, the coral polype would
 commence to build near the border of some island, and
 would thus form a fringing reef. If the island remained

stationary, the reef might increase in breadth, but would still remain a fringing reef. If, however, the island were slowly to subside, and the whole colony of zoophytes still to keep at work, there would gradually be a clear channel of water between the reef and the island, and we should have an example of an encircling reef. If the process still continued, the central island would in time disappear, and an atoll would be formed.

The reef-building coral cannot thrive except in clear salt water; the weakest part of the reef is therefore on the lee side, where the water is less clear; here in most atolls is found a wide opening which connects the central lagoon with the sea outside, and admits the flux and reflux of the tide.

"Physical Geography," by W. LAWSON.

A GREAT WATERFALL.

PEOPLE who have never seen a really great waterfall are apt to despise waterfalls altogether. Those who have watched one know that the greatest exhibition of persistent natural energy in all creation is a great spectacle. Three years ago appeared a new claimant for the title of "the highest waterfall in the world." Niagara is, of course, unapproachable in its own class, and it is in the highest degree unlikely that any rival to it, for volume of water and breadth of fall, yet remains to be discovered. But in height, as is well known, Niagara stands low among great waterfalls, and the highest of those which can really claim to be great may yet reward the enterprise of some future African or South American explorer.

Kaieteur, the waterfall which was discovered in 1870, is a fall of one of the western branches of the Esquibo,

the Potaro, or Black River. It was discovered by Mr Charles Barrington Brown, the surveyor to the British colony of Guiana, and ascertained by him to be 130 yards in breadth, between 20 and 30 feet deep just above the fall, and no less than 750 feet high, or four times the height of Niagara. For its surpassing beauty, the weird remoteness of its situation, the striking character of its approaches, and the exceeding difficulty of access to it, I am one of the half-dozen travellers who can answer. In consideration that no other waterfall of equal or greater height (clear leap) is of anything like the same magnitude, we announced it with confidence as "the biggest waterfall in the world." The waterfalls of the Yosemite Valley in California, which in some American accounts reach astonishing dimensions, have never had the luck to be seen by an Englishman in volume anything like the proportions of a "river set upright."

I have now the satisfaction, mingled with mortification, of announcing that Kaieteur has been outdone. Mr Brown, in the last of his adventurous series of journeys to the sources of the great rivers of British Guiana, has discovered, from a spot near the head waters of the Masarund, what at 30 miles distance appeared to be an immense river descending bodily from the north-western face of the great precipice of Reraima mountain, "the attic story of the world." This extraordinary cliff is known to be 2000ft. in height, and appears inaccessible on all sides yet surveyed. The summit is flat, and of great extent. The fall is believed, on Indian authority, to belong to the Caruni River, a tributary of the Orinoco; and will be, therefore, in the territory of Venezuela. After tumbling sheer down that astonishing wall, the water rushes down a glaci^s of (perhaps) 3000ft. more, at an angle which cannot be less steep than 45°.

The difficulties of approaching Reraima on this side must be very great; but it is a satisfaction to think that there is some good rummaging ground still left for the energies of the Young England of the future.

GEORGE YOUNG—*Letter in the "Times."*

1. GLACIS, a smooth slope. (Lat. *glacies*, *ica*.) A term used in Fortification.

THE BORE ON THE SEVERN.

A MOST remarkable natural phenomenon was observed yesterday morning, Friday, March 20, 1874. A gigantic tidal wave called "the Bore" made its expected appearance, accompanied by an unusually high tide, in the Severn. Anxious to see if the salmon fisheries would be affected by it, I, in company with Messrs Cadle and Bennett, of Westbury-on-Severn, members of the Board of Salmon Conservators, and the Rev. the Vicar of the parish, waited the arrival of the Bore at Denny Rocks, five miles below Gloucester. At 9.20 A.M. some boys perched high in a tree shouted out the warning, "Flood O!" "Flood O!" and then to a minute of her time, up came the Bore, sweeping with a magnificent curve round a bend in the river. Hurrying towards us with fearful force and velocity, rushed a dense wall of water, curling over with foam at its summit, and extending right across from bank to bank.

As the wave approached nearer and nearer, the "voice of many waters," accompanied by a strange and sudden blast of cold wind, was truly awe-inspiring. In an instant the Bore swept past us with a mighty rush and the whirl of a thousand race-horses passing the grand stand. Two angry precipices of water, the escorts on either side of this terrible wave, swept with terrific

weight and power along the banks, throwing high up into the air, and well above the pollard trees, a sheet of water mixed with mud and sticks. We all cheered the Bore as she passed, so grandly were nature's race-horses running their course. In a few moments after the Bore had passed, the river, which had been rather low before, was "full up" from bank to bank, and, having previously taken marks, I ascertained that the sudden rise of the water was between 11 and 12 feet. An old man told me that this was as good a head as he had seen for 40 years. The tide following the Bore rose with great rapidity, and flooded the fields and roads far and near.

It was most interesting to see a barge plunge up like a rearing horse to take the Bore, while some frightened ducks swam out into the river and topped the wave in a most graceful manner.

The Bore is thus formed. A great tidal wave coming in from the Atlantic is narrowed by the funnel-shaped estuary of the Severn, it is then pushed forward by the weight of the ocean behind ; mixed sea and river waters then assume the form of a wave, which beginning below Newnham, increases in height as the banks narrow, and ultimately subsides above Gloucester. A Bore also runs up the Solway and the Humber, where it is called the "Eagre" or "Hygre."

FRANK BUCKLAND.

The curious phenomenon called the "bore," or "barre," described above by Mr Frank Buckland, may be seen any day on the river Parrett, just below Bridgewater ; and as both the Severn and the Parrett flow into the Bristol Channel, the same tidal wave produces the "bore" in each of these rivers, the height of the "bore" being doubtless determined by the force of the tidal wave.

Permit me to suggest that the word "bore" may be a

corruption of the French "*barre*," the onflowing wave having the appearance of a straight line, or bar, drawn across the river.

This phenomenon is one familiar enough to the inhabitants of Calcutta in March and September. It is in the Sittang, however, between Rangoon and Moulmein (British Burmah), that the "bore" is seen in its grandest form. The river is the only one, I think, that ships go up but never come down again. I have never myself seen the "bore" come up the Sittang, but Burmese and Europeans have described it as enormous—utterly destructive, in fact, of all navigation.

Extracts from Letters in the "Times," March 1874.

THE SHIP *CHALLENGER* AND THE GULF STREAM.

By private letter we hear of the arrival of the *Challenger*, Captain E. Nares, at Halifax, on the 9th of May 1873. The letter contains some interesting accounts of the surveying in which the *Challenger*¹ is engaged. The bottom between Bermuda and the American coast was found to be fairly level, at a *maximum* depth of 2850 fathoms, to within about 150 miles of the land, where it rises with a rather abrupt inclination to the shallow water. Immediately outside the Gulf Stream a depth of 2425 fathoms was found, and inside only 1700 fathoms. The Gulf Stream was found to be about 60 miles broad, the pressure being manifested in the most unmistakable manner, as the stream ran past the vessel at the rate of over three miles an hour while she was anchored to a current drag, lowered into the stationary water below it, and forced to steam ahead at that rate to keep the *suspending* line straight up and down. The

serial² temperatures taken during the passage are extremely instructive and important, showing, as they do, that a band of warm water of about 64 degrees Fahrenheit, and 400 fathoms in thickness, extends from the eastern margin of the Gulf Stream to within a short distance of the West Indies, enclosing the Island of Bermuda, and actually raising the average temperature of its superficial water above that of the corresponding layer 600 or 700 miles further south. If this band is connected with the similar one, only eight degrees colder, which is known to exist on the opposite side of the Atlantic, off the coasts of Europe—as it in all probability does—the old calculations concerning the influence of the Gulf Stream on the European climate, which merely take into account the actual volume of the stream itself as it issues from the Straits of Florida, will have to be reconsidered; for this vast body of apparently sluggishly moving water, 1000 feet in depth, and occupying the whole of the northern part of the Atlantic, must claim a considerable share in the combined general modification of climate.

1. CHALLENGER, a vessel sent out, in the year 1874, by the Government of this country, to examine the currents, islands, and sea-floor of the Atlantic, &c.

2. SERIAL, in a series or regular order. (Lat, *sero*, to join).

THE GREAT PAMIR STEPPE

ALL evidence, traditional or scientific, points to the East as the habitation of our remote forefathers, and the light lately thrown upon the comparative structure of languages narrows the probable source of those, best known by Europeans, to a spot certainly not far removed from the birth-place of four great Asiatic rivers, which

flow approximately¹ towards the four points of the compass—the Indus, the Yokand River, the Jaxartes, and the Oxus. These all spring from waters poured down from the Great Pamir Steppe² and its neighbouring mountains. Trace them from their mouths to their sources, and you always approach one central district. Trace back the migrations of the Hindus and Persians—of the Aryan races, we may say—you come upon Badakshan and the slopes of Pamir. The languages of these nations are but developments of a “mother tongue,” still spoken by “ancient and broken tribes living in secluded valleys in the same region.” Finally, the labours of comparative mythologists³ have caused those who seek for the origin of Greek and Roman myths, the wild legends of the North of Europe, and even our English fairy tales, to find them in the adoration of Nature’s power, which stood for religion with the earliest ancestors of these very Hindus and Persians—races whose ancient homes seem to have been upon or near the slopes of Pamir. The great plateau of Pamir—the “roof,” or rather “first floor of the world,” in native language—is, as far as is known, at least 180 miles long by 100 broad, and may be said, on the average, to be about the height of the top of Mont Blanc. In winter it is covered with snow, but the summer sun causes this to disappear, and supplies its place with a mantle of the richest verdure. So rich is the pasturage, according to the description by every traveller who has succeeded in finding his way to the garden of Eden—as the plateau and its surroundings are held to be by many who have interested themselves in this very antiquarian research—that lean kine fed there become fat in a month, while the great sheep described by Marco Polo⁴ are abundant. Yet so light and keen is the air that the pulse nearly doubles its pace,

and a few strokes of an axe, or a run of a few yards, brings a strong man, unaccustomed to breathe such ether, to the ground panting and exhausted.

The Times, April 1873.

1. APPROXIMATELY, coming near; approaching. (Lat. *proximus*, nearest, superlative of *prope*, near.)

2. PAMIR STEPPE, a large and elevated plain in Central Asia, on the borders of Turkestan; it is also called *Barn-i-Dunia*.

3. MYTHOLOGISTS, persons learned in *mythology*, the study of ancient fables or myths.

4. MARCO POLO, a celebrated traveller of the thirteenth century; he was a native of Venice; he visited Tartary, China, Japan and other parts of Asia, countries, until then, almost unseen by Europeans. Polo wrote an interesting narrative of his travels; some of his accounts are incredible and absurd, but the greater number are both curious and true.

A SUBMERGED FOREST IN THE THAMES.

It is not generally known that both at Plumstead and Dagenham, and in other parts of the Thames between Woolwich and Erith, there are visible, at low water, the remains of a submerged forest, over which the river now flows, suggesting curious questions as to the former physical geography of the country. The phenomenon was first described by Captain Perry about 150 years since, in the interesting narrative he has left of his repairs of Dagenham Breach; and in 1817 the late Dean Buckland brought it before the notice of the Geological Society of London. Still more recently the existence of this forest bed right across the valley of the Thames, and even under the river itself, has led a well-known geologist to trace the former physical geography of the district, and by the correlation¹ of other local phenomena to conclude, that the present outlet to the

Thames to the North Sea is of quite recent origin (speaking geologically), the waters having formerly passed southwards into the Weald,² by channels which still remain. To see the forest bed for themselves was the object of our visitors. Accordingly, the party proceeded across the Plumstead Marshes to Crossness, where they were to take boats to examine the outcrop of the trees at the river side. This arrangement, however, was found to have been defeated, for the tide had turned and was rapidly rising above the level of the buried trees. But the contingency had happily been provided against, an excavation some twelve feet deep having been made in the marsh for the occasion. Here the forest bed, with its interesting contents, lay well exposed to view. Overlaid by some six or eight feet of marsh-alluvium was seen a great bed, full of twigs, leaves, seed vessels, and stools of trees, the species of which were determined by the botanists to be chiefly yew, alder, and oak. A collection of animal remains, consisting of antlers of red deer, jaws of the long-fronted ox, and other recent species, obtained from the same forest bed during the excavations in 1862-3, was also exhibited.

Extract from the "Times," 1873.

1. CORRELATION, the relation or connection of one thing or person with another.

2. THE WEALD, an extensive and fertile plain in Surrey and Sussex, lying between the North and South Downs. The name is derived from the Saxon *Wald*, a forest, and this plain was formerly a great forest.

THE SUPPLY OF WATER.

IN an address to the Cocker-mouth Scientific and Literary Society, Mr Isaac Fletcher, M.P., referred to the rainfall among the Cumberland mountains. He said the

prevailing winds being from the south-west, came to the shores of Cumberland laden with the warm vapour from the Gulf Stream, and that vapour, impinging¹ on the cold sides of the mountains which attracted it, was condensed into those prodigious falls of rain, which had made Cumberland famous among meteorologists.² The annual fall at Carlisle was about 25 inches, in London 23 inches, and the probable average of the whole of England from 25 to 30 inches. The average at the sequestered hamlet of Seathwaite, in Borrowdale, was 134 inches, but at the end of the valley on the sloping face of the Sty^e,³ at an elevation of 1077 feet above the sea level, the average fall was probably about 170 inches. The year 1872 would long be remembered as one of the wettest on record. The average fall of rain in Cockermouth and the neighbourhood was 46 inches, but last year it was 56 or 57, and on the Sty^e the fall was actually 244 inches, being by far the largest annual fall ever recorded in Europe.

Now, a uniform depth of one inch of water over a surface of one acre represented a weight of 100 tons; consequently on the Sty^e in the year 1872 the amount precipitated on each acre of ground was no less than 24,400 tons. He had little doubt, that the rain-gauge⁴ he had had on the Sty^e, since 1864, would some day bring both fame and fortune to some enterprising engineer.

We all know the great expense to which all large towns are subjected in order to provide a water supply for their inhabitants. In London this difficulty has become so great, that schemes have already been placed before the public for supplying the metropolis from the mountain regions of Wales; but it was not only possible, but highly probable, that ultimately they would have

to come to the Cumberland lakes and mountains for a permanent supply, for they possess every necessary element for the purpose. In the first place there is abundance of water, and in the second place ample storage in the lakes and valleys, and if reservoirs are required at great elevations, they can be easily and cheaply constructed. The gorge of Styhead Pass has, at its south-western extremity, at an elevation of 1472 feet, a beautiful tarn ⁵ where the fall last year was 170 inches, and connected with it on the ascent towards Scawfell Pike, at a height of 1985 feet, is Sprinkling Tarn, where the fall was 177 inches. These two tarns, with no great amount of engineering skill, could be converted into immense reservoirs, with a watershed sufficient to supply every town in the north of England with abundance of perfectly pure water without pumping power, and by gravitation alone. He looked forward with the utmost confidence to some scheme of this kind being carried out, and that not in the remote future, but possibly in the lifetime of some in that room.

Extract from the "Times," 1873.

1. IMPINGING, striking against. (Lat. *pango*, to strike.)
2. METEOROLOGISTS, persons skilled in the science of meteorology, a science which treats of the atmosphere and its phenomena.
3. STY, a mountain in Cumberland.
4. GAUGE, a standard of measure.
5. TARN, a small lake among mountains. (Derived from the Icelandic *tiörn*.)

USEFUL TREES OF THE PINE FAMILY.

THE trees of the pine family (*Coniferæ*) are of great importance, from the number of species which afford valuable timber, and also from the various products obtained from some of them.

Among those most valued for the sake of their timber are :—

Scotch fir, affording yellow deal—this is the only pine now native in Britain ; the Norway spruce, yielding white deal, formerly a British tree, as its cones are found in very recent geological formations ; Weymouth pine, the most valuable timber fir of North America ; Douglas pine, of which a spar 159 feet in length is erected as a flag-staff in the pleasure-grounds at Kew ; larch, used largely for railway sleepers ; the New Zealand “ Cowdi ” or Kauri pine, affording mast spars 200 feet long. The wood of the cypress—which is also a member of the pine family—is almost imperishable ; the gates of Constantinople made of this wood, lasted 1100 years. The wood of the *Juniperus Virginiana* is commonly used to enclose lead pencils, under the name of the red cedar ; the wood of the true cedar is, however, comparatively worthless. The wood of the yew is said never to be attacked by insects ; bows were formerly made of it in Britain, and by an Act of Edward IV., every Englishman was obliged to possess a bow of his own length, made either of yew, wych-hazel, or ash. Yews attain a very great age, some English trees being estimated at about 2000 years.

The largest trees in the world are members of the pine family ; they are called *Wellingtonia Gigantea*, grow in California, and are mammoths among trees ; one specimen has been described 450 feet high, and 116 feet in circumference.

Of resinous products, the most important are tar and turpentine. Tar is distilled from faggots of pine, chiefly Scotch fir, in the north of Europe. The residuum, left after the distillation of the liquid part from tar, is called pitch. Turpentine is afforded by several species of pine,

especially one variety growing chiefly in America. The turpentine exudes² from wounds made in the trunk near the ground. Common resin, or rosin, is the residuum after distillation of the oil of turpentine. The Cowdi or Kauri resin, one of the most important exports of New Zealand, is exuded by the pine of the same name; it is used in the manufacture of varnishes, &c. The largest masses of it are said to be found buried in the soil far from places where the tree now grows, but probably on the site of ancient pine forests.

The seeds of a few species of the *Coniferæ* are edible, those of the stone pine being brought to market in the south of Europe, strung together like beads on a string. The large seeds of the Bunya-Bunya pine are eaten by the aborigines³ of East Australia. Juniper berries are used to flavour gin.

"Elementary Botany," by PROFESSOR OLIVER.

1. RESIDUUM, residue: that which is left after any process of purification.

2. EXUDE, to discharge through pores or incisions. (Lat. *sudo*, to sweat.)

3. ABORIGINES, the original inhabitants of a country. (Lat. *origo*, origin.)

SOME USEFUL GRASSES.

THE corn-producing or cereal¹ grasses are the chief members of a family, which is unquestionably the most important in the vegetable kingdom to the human race, furnishing almost everywhere, and from the most remote antiquity, the principal basis of food. Rice alone affords a larger proportion of food to mankind than any other single species; while in cool climates, wheat, rye, barley, and oats, and in warm countries, maize, millet, and durra are universally grown.

Wheat is the most valued and nutritious of the cereals. Its native country cannot now be determined, as is the case with several plants, which have been cultivated over a long period. This may be owing either to changes gradually introduced by cultivation, of such extent that the parent form is not recognisable, or to the original type having become extinct.

Some botanists have tried to show, that wheat may have been derived from a south European grass, called *Egiloss*, forms intermediate between wheat and one or two species of *Egiloss* having been occasionally met with; but this theory cannot be satisfactorily proved.

Numerous varieties of wheat are cultivated, red, white, bearded, &c.

Maccaroni and vermicelli are prepared from the finest wheat flour, chiefly in Italy.

Barley is considered to have been the first cereal brought under cultivation. It was grown in Palestine and Egypt, and is mentioned by Homer.

Malt is prepared by steeping barley for about fifty hours, and then placing it during nine to sixteen days, on a floor of slate or cement until it germinates, or begins to grow. It is then put into a kiln and heated to 160° or 180°, then screened, thrown upon wire sieves, so that the sprouts, called *coombs* or *chives*, are broken off or separated. Germination² converts the starch of the grain into a kind of sugar, which is capable of vinous fermentation, by which process alcohol³ is formed. In brewing, the malt is steeped until the sugar is dissolved out, forming the "sweet wort;" this is left to ferment, hops being added to impart a bitterness and preserving quality.

Oats appear to be of comparatively recent introduction, not having been cultivated by the Hebrews, Egyptians,

Greeks, or Romans. They were early grown, however, by the German races.

Rice is grown in nearly all hot countries, on lands artificially watered or irrigated. We import it from India, and the Indian Islands, Southern United States, and south of Europe. Upwards of 4,700,000 cwts. of rice with the husk removed, were imported into the United Kingdom in 1868.

Maize, or Indian corn, is a native of the New World, though now introduced into the warmer regions of this hemisphere, where it is cultivated to a great extent, especially in the Indian Islands and North Africa. It is the largest of the cereals, from 300 to 800 grains appearing upon one stem; it is not, however, so nourishing as wheat. A preparation of maize is sold under the name of Oswego corn-flour. Leaves of maize are used for packing oranges.

The stems or straw of various cereals, and of some wild grasses, are used for plaiting, being split by simple instruments into narrow strips; or, as in the case of Leghorn straw, used whole, when it is extremely tough and durable. Straw is also worked up into cheap and brittle paper.

"Elementary Botany," by PROFESSOR OLIVER.

1. CEREAL, belonging to Ceres, the goddess of corn.
 2. GERMINATION, the act of sprouting. (Lat. *gero*, to produce.)
 3. ALCOHOL, pure spirit, a liquid formed by the fermentation of sugar and other saccharine matters, and forming the intoxicating element of fermented liquors.
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FUNGI AND LICHENS.

THE common mushroom is a fungus, and belongs to a widely spread family.

It possesses a vegetable system growing under the surface of a soil containing decaying organic¹ matter. The fructification² is borne above the surface, in the form of an umbrella-like dish called the *pileus*, upon a stout stem; the margin of the pileus is, at first, united by a membrane to the stalk, from which it breaks away, leaving a ring-like scar. Upon the under side of the pileus, numerous vertical³ plates radiate from the top of the stem to the margin of the pileus. If a very thin cross-way section of one of these plates be cut with a sharp knife, and examined under a powerful microscope, the surface will be found to be studded with large cells. Other fungi depart very widely from this type, but nearly all agree in the absence of green-colouring matter, and of starch in their cells, and in their dependence upon decaying animal or vegetable matter for their support. They are most short-lived, and often become thready and liquid when mature, though some, as the touchwoods, are hard, woody, and persistent.

In many fungi there is no distinction of stem and pileus, as in puff-balls, or the growth is altogether subterraneous as in truffles.

Though a few of the fungi are good for food, many are dangerous, and some poisonous. None should be eaten unless perfectly sound, and species with a disagreeable odour should be avoided.

Many fungi are very injurious, destroying large quantities of agricultural produce, timber, &c., when circumstances favour their development. The wheat mildew,

smut and bunt of corn, ergot, hop-blight, the moulds found on preserves, bread, &c., and the dry-rot which eats into timber, are all fungi. The vine and potato diseases are also due to the ravages of minute species, which multiply with great rapidity.

Lichens are not fungi, and must not be confounded with them, as they form a distinct family.

Lichens occur as crust-like or leafy expansions, or in little branching shrubby tufts, usually coloured grey, yellow, or greenish yellow. They spread everywhere over stones, brick-walls, the bark of trees, posts, and even upon the most exposed rocks of Alpine and Arctic climates, forming the very outposts of vegetation, and growing at the expense, almost solely, of the atmosphere and the moisture, that it bears to them.

Unlike fungi, lichens are long-lived and intermittent in their growth, being at a stand-still, and often crumbling away, when the weather is dry. They differ also from fungi in containing a green-coloured layer under the outer skin, consisting of cells, which may be regarded as answering to the buds of higher plants, since when set free they develop new lichens, and thus multiply the plants.

Several species of lichen afford valuable purple and mauve dyes; a few are edible as the so-called Iceland Moss. The Reindeer Moss is not a moss but a lichen; it is extremely abundant in polar regions, serving as food for the reindeer.

"Elementary Botany," by PROFESSOR OLIVER.

1. ORGANIC, pertaining to the organs by which natural operations are carried on; *organic matter*, animal or vegetable matter.

2. FRUCTIFICATION, all the parts of a plant that compose the flower and fruit. (Lat. *fructus*, fruit.)

3. VERTICAL, perpendicular; straight downwards.

DEARTH OF LABOUR IN THE COLONIES.

THE dearth, which may be said to extend through the fairest regions of the southern hemisphere, is the dearth of labour. It is the scarcity of men. It is the high price, that must be given to any average possessor of the usual complement of limbs, blessed with common health and strength, and able to do a day's work. The market for labour is so high in those regions, that any working man can be sure of wages, that will enable him to live well, to keep his family well, to put money by, and to become farmer, landowner, and all that he commonly desires. In New Zealand our people are at their wits' end for working men. The European population of both islands—all three, as they prefer to be described—is only about a quarter of a million. But this mere handful possesses an unlimited territory, fertile, beautiful, and pleasant to live in ; it is full of vigour and enterprise. It has rapidly-increasing public revenues, the Canterbury Province alone half a million a year ; it is pushing railways as fast as they can be made ; it has abundance of flocks and herds, only wanting more shepherds and herdsmen ; it has minerals, useful or precious, for those who choose to dig for them. One thing only it has not, and this single want half spoils all the rest—it has not hands enough.

But farmers have a hard life in Canada : anything more desolate than the wild tracks through the forests there I cannot conceive.

The truth is, none but the hardest and most persevering men can do any good in these wild regions, and they must lay their account for years of "roughing it." I am driven to the conclusion, that if men in England were

to work as hard, and to live as hard, and to abstain from strong drink, as they do and must do to get on abroad, very few of them would need to leave their old homes. Those poor villagers of my acquaintance in Berkshire, Oxfordshire, and Wiltshire, are rich by comparison with many of these owners of hundreds of acres. They have social comforts and advantages, which I look in vain for among the scattered shanties of these Canadian forests. The truth is, that the voluntary hardships of Canadian settlers are far greater than any of the involuntary ones, which are imposed on English labourers.

Take a case in illustration. Just as we were ploughing our way through the last mile or two of mud before reaching this town, we pulled up to speak to a farmer, who was standing at his shanty door. This man was the first settler in this neighbourhood. He told us, that when he came nine years ago he had to hold his own against the Indians. One day an old Indian came into his log hut, and brandishing a formidable club about him, warned him off the place, crying out, "What business have you white man here in our land?" The white man was unarmed, but, by a firm demeanour, managed to get rid of the intruder. There were other Indians close at hand. After years of incessant toil he has got some forty acres of his land "cleared," by which term it must not be understood that the land is anything like our English fields. They cut the trees down within about three feet of the ground, and when the timber has been either burnt or cut up into "lumber," as the case may be, they call the land "cleared." The final stage of clearing—the removal of the stumps—is extremely hard work, and where it is done extensively you have *the best possible proof of the prosperity of the owner.*

I saw among the implements at Hamilton a machine for the forcible removal of these stumps.

Extract from the "Times," Feb. 1873.

MECHANICS AS TAUGHT BY NATURE

To the extensive storehouse of nature's contrivances, perhaps every branch of art and science resorts more than it is willing to allow. When the government, about 100 years ago, referred the question of a lighthouse for the Eddystone Rock to Smeaton, he did not contrive a lighthouse, or even consider he was called upon to design one. What he did was to look about through nature's storehouse, and consider where and how resistances were met similar to the resistances he was called upon to meet. Hence, when he published a report of the designing and executing of the present Eddystone Lighthouse (three or four previous ones having been either burned down or washed away), he printed, side by side, with a drawing of the structure he proposed, the trunk and branches of an oak tree, which he took as his model.

There may be many who remember the year 1851, when this country was very much perplexed to know what to do with the Exhibition it had summoned, and did not know how to put it under cover. Architects, engineers, and others were completely baffled. They felt, that if they raised a building, either of brick or stone, damp in the walls would spoil the treasures of art to be deposited there. In the crisis a gardener came forward, and to him is due the credit of having suggested the design for the building.

This gardener was Sir Joseph Paxton, no engineer, as he himself owns, who writes thus of the Exhibition.

"Nature was the engineer in this case," and he requests those, who choose to do so, to compare the leaf of the water lily (the "Victoria Regia") with the building erected in Hyde Park, for he says, "from this I obtained all my ideas" of what should be comprehended in the first iron and glass building that was ever seen.

Let us look at a few more illustrations. A spider's web across a garden path suggested the Menai¹ bridge to Telford before 1818. The structure of bones suggested the tubular one which carries the railway across the Menai Straits. The little worm, which perforates the wood of ships, suggested the Thames Tunnel to Brunel; the telescope, the microscope, and the camera obscura² are all clearly set forth in the eye; it was a lobster shell, which gave the idea of curving wrought iron tubes to Watt; wasps make paper, and there are other wasps, that make paste-board. Spiders form nets; hail and shot are formed exactly alike. Birds' feathers suggested the slates to our houses, and birds' nests are lessons to this day in basket-weaving.

England, as an island, is warmed as this room is warmed. In the torrid zone there is a boiler and furnace, and the Gulf Stream is the enlarged pipe of a huge heating apparatus. In the hand we have a vice,³ and looking at that vice, which we all possess, from a mechanical point of view, it is evidently one more perfect than the most ingenious vice the accumulated skill of engineers could possibly produce. There are eight or nine different vices in one; that is to say, it is a vice of varying size and form; it needs no clams; there is no chance of damaging the work put in it by the serrated edge, as is the case in an ordinary vice, for, as you know, clams of wood, lead, cloth, and other materials are used to save the work. Look at it from any point of view, it is un-

approachable. If you want to hold a circular piece of metal, how much more beautifully do you do it than can be done by any contrivance of engineers. You hold it between two fingers and a thumb. Although this is a question of statics,⁴ it is worthy of a few moments' consideration. You observe many people put things upon four legs; theodolites,⁵ instruments, tables, &c., are generally put upon four legs, but nature tells us we should put them upon three. When this pencil is held on three sides by two fingers and one thumb, you cannot press it in any direction without its meeting with resistance, but once put it between four fingers, and there are four places in which it may escape. Another peculiarity of this vice (viz., the hand) is, that you may hold a chisel in it so as to be quite steady, and yet it will slide along, and there is no vice known to me, which will do this. This vice, then, is not only a very curious one, but it is one possessed by no animal except man. Look, again, at the wrist joint. We have vices with balls and sockets, and universal joints, but none equal to this universal joint at the wrist. There is a fortune to anybody, who can make a vice to equal it, so simple and so universal. Then, again, the stomach is a perfect laboratory.⁶ The lungs are a bellows; the skull is an arched vault, beautifully put together; and the teeth!—what a complication we have of knives, saws, wedges, and mill stones; and in the jaws there is an arrangement, which has often been tried, but which has never yet been successfully attained, called a draw-cutting action, the nearest attempt to which is in bread, hay, and paper-cutting machinery. Not only is the eye a telescope and a microscope, but there is in its apparatus, viz., in the "iris," a specimen of what engineers have been attempting for a long time—an expanding pulley. No expanding pulley has yet

been successful. To adapt such suggestions as these supply, and to combine them with the structural schemes which ingenuity or necessity furnished, seemed to satisfy all the wants of men until the steam-engine enlarged its usefulness by giving a rotary motion in addition to a reciprocating rectilinear⁷ one. Watt did this in 1770, and from that time we began to date our mechanical progress.

Extract from a lecture on Mechanics by the
REV. A. RIGG, M.A.

1. MENAI STRAITS, straits between Carnarvon and Anglesea in Wales. The straits are crossed by two famous bridges, a suspension one built by Telford, and a tubular railway-bridge. The latter formed of hollow iron tubes fitting one into another.

2. CAMERA OBSCURA, a dark chamber or compartment in which are exhibited the images of external objects on a white surface placed within it. These images are depicted by the rays of the sun entering through a small hole, and are perfect miniature copies.

3. VICE, an instrument consisting of two jaws, closing by a screw, for holding anything tightly, used by smiths, carpenters, &c.

4. STATICS, the science which treats of the properties of bodies when standing still, or at rest.

5. THEODOLITES, instruments used for surveying, observing, and measuring heights and distances.

6. LABORATORY, a place for labouring or working in ; a chemist's workroom. (Lat. *labor*, labour, toil.)

7. RECTILINEAR, in straight lines. (Lat. *rectus*, straight, and *linea*, a line.)

THE CENTRE OF GRAVITY.

PART I.

EVERY atom of matter is equally attracted to the earth. When the atoms form a solid, they cannot separately act, but, as it were, concentrate the whole weight of the body at a point which, if supported or suspended, will balance, hold in equilibrium, or keep in a state of

rest the entire mass : this point is called the *centre of gravity*.

If a stick be laid across a finger, one particular spot will be found, where it will balance and remain at rest ; that part is the centre of gravity in the stick. The bulk and density on both sides of this point of the stick will be equal ; and thus, by a sufficient support at this part, the attraction of the earth is successfully resisted, for in any other position the stick would fall to the ground. The centre of gravity appears, then, to be the point which seeks the lowest level, and exists in everything, of whatever shape it may be, in the universe.

By lifting a solid body at this point, the whole is lifted ; or by preventing this part being moved, the mass is kept at rest.

A rod of iron having equal quantities of matter throughout its length, will have its centre of gravity exactly in the middle. If a piece of wood, or any other substance, in the shape of a triangle, be suspended from

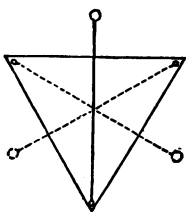


Fig. 1.

each of its angular points, so as to swing freely, and a string with a plummet attached, it will exactly cut the triangle in two from each point ; and in the centre, where the lines cross each other, will be the point of gravity. By marking the lines with a pencil or piece of chalk, the exact spot can be found.

A line drawn from the centre of gravity direct to the earth is called the *line of direction*. This is only an imaginary line, but one of great importance in the concerns of life ; for if a square or angular figure be placed upon the ground, and this line does not fall within its base, it will fall over. This is most clearly illustrated

in the case of a loaded cart. Suppose a cart (see figs. 2

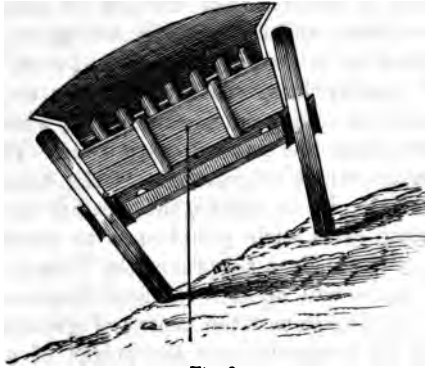


Fig. 2.

and 3), having lead or iron in it, passes along an uneven



Fig. 3.]

road, by which one wheel is raised much higher than the

other, and the centre of gravity be at the part marked at the back of the cart, then the line of direction falls within the wheel, and the cart will not upset; but if it be so loaded as is done with hops and wool, then the centre of gravity is moved much higher up, and the line of direction falling outside the wheel, which in this case is the base, the cart will turn over. Thus, then, the nearer the centre of gravity is to the base, and the line of direction in its middle, the steadier an object is. This is what gives such prominence to those colossal erections of the ancient Egyptians, the Pyramids.

A ship at sea will upset in a squall from not having sufficient ballast,¹ so that the centre of gravity must be low down to counterbalance the weight of masts and rigging; while if the vessel be loaded only close to the keel, it rolls about most unpleasantly.

In a steamboat having the deck laden with passengers, as seen on the Thames and elsewhere, the greatest cause to anticipate an accident lies in some event occurring, from which the people might start upon their feet and rush to one side of the vessel, when the centre of gravity being changed, it would capsize, and the pleasure-seeking crowd be launched into the stream.

Accidents in boats are of continual occurrence, in consequence of people, instead of sitting or standing steadily, or lying at the bottom of a little bark, rushing to one side on the slightest cause for fear; and thus creating the very mischief which they desire to avoid.

In a round ball equally made, the centre of gravity is in the middle, but the base of all round bodies is a mere point. This is what enables them to move with little force, so that even a gust of wind whirls them along a smooth surface.

The celebrated belfry or round tower at Pisa, in Italy,

encased with marble, is 190 feet high, and leans to one side twelve feet beyond the foundation; but the line of direction is within the base, and therefore it safely stands, to astonish and frighten the gazing traveller.

At Bologna there is a tower 165 feet high, having an inclination of seven or eight feet from the perpendicular, yet it stands firmly, for the same reason that applies to the Pisa Tower.

PART II.

In scale-beams² the centre of gravity is made in the same place as the centre of motion, from which arises the utility of the machine, as it will rest according as it may be adjusted in the placing of weights and materials upon each side.

Rope-dancers, that they may balance themselves on a narrow foundation, use a long pole loaded at each end with lead; this they hold across the rope, and fixing their eyes upon some object, perceive when their centre of gravity tends either to one side or the other, which they recover by a movement of the pole, and thus keep the centre of gravity over the base.

Among other devices of itinerants³ to gain a precarious⁴ livelihood is that of dancing upon stilts, imitating the unstable rollings of a drunken man, and hopping upon one long leg or pole. This is all cleverly performed by a due attention to the preservation of the centre of gravity.

When a person stands on one leg, the other leg is held up behind to adjust the centre of gravity. This is beautifully shown in the famous statue of Mercury, who is poised on the toes of one foot, while the other is *elevated behind*. Opera-dancers while raised on one

foot, and the body leaning forward, balance themselves by raising the other in such a manner as to preserve the centre of gravity over that part touching the ground.

On ascending stairs, the body is bent forward, that the centre of gravity may advance with the feet.

When we walk, we change the base from one foot to another ; this gives a swaying motion to the body. Thus people cannot walk well together when linked by their arms without keeping in step, that both bodies may have the same motion.

When carrying a burden on the back, we lean forward ; if on the chest, we lean backward ; if on either arm or shoulder, we lean to the opposite side.

In that useful domestic utensil, the pail, the centre of gravity is near the centre, and the handle, which is the centre of suspension, being fixed vertically over it, the centre of gravity must ascend ; this, therefore, keeps the contents safely within the vessel. In some measures, such as those used for coals, which are heavy, and have to be frequently emptied, the handle is placed lower ; thus little power is required to upset it, and empty the contents out quickly.

In some instances the centre of gravity is not in the object itself, as may be illustrated in a ring, where it is in the middle of the space measured from every part of the solid circle.

If we take a circular piece of wood, and near the edge drill a hole, and place a piece of wire through it, the wood will steadily hang from this axis ; by making the hole exactly in the centre, the point of support will then be the centre of gravity, and the wood may be placed at rest in any position ; but if the hole be made below this central spot, then the wood is most unstable, and the least motion will cause it to reverse its position, as the

—

centre of gravity will endeavour to get below the point of suspension. Thus, when the point of suspension is far above the centre of gravity, the balance of the body is more likely to remain undisturbed. It will be seen, then, that in constructing fine balances it is necessary to make the point of suspension just below the centre of gravity ; the balance is then delicate and easily moved, which gives value to the instrument.

In many mechanical contrivances, as well as in the truths of science, the position of the centre of gravity is an important fact to ascertain, and it is known simply as any other question in figures. If a rod be five feet long and equally made, the centre of gravity will be exactly in the middle of the length ; but if a weight of one pound be fixed on one end, and a weight of four pounds on the other end, then the centre of gravity will be at one foot distance from the four-pound weight, the other weight and four feet of the rod being required to counterbalance the opposite ; thus the length of rod at each side from the point of suspension is in exact opposite proportion to the weights—that is, as one to four. This is also called the *centre of inertia*,⁵ and is the *centre of centrifugal*⁶ force as well ; for were a whirling body not to have its axis made in that part, one portion of the hole in the wheel would wear out much quicker than the remainder.

Were a small ball attached to a larger one by a chain, fired out of a cannon, the two balls would be seen to fly round and round each other, and their centre of gravity not being in either ball, but, according to their proportion, nearer to the larger one, the rotatory motion would be described round this point.

The sun and the earth are bound to each other by *attraction*, and have a centre of gravity. In so speaking,

we are not now describing atoms of matter, but masses; suppose, then, the earth to be 1, then the sun is 354,936; and the centre of gravity of the sun will be 270 miles from its centre, which is the $\frac{1}{3500}$ part of its diameter.

The earth and the moon, by the attraction of the sun, revolve around it, and are as one mass of matter to that great body. The earth is a large ball, and the moon a small one, and they are held together by attraction as if by a bar of iron; thus they form a joint system, having a common centre of gravity. The moon is in bulk but the 49th part of the size of the earth, while from its density it is not more than the 70th of its mass; thus the mutual centre of gravity, which will mark the line of the motion of the two bodies, is a little below the earth's surface.

Quadrupeds, from the broad base they have to support their weight, are able to walk sooner than man. A horse, when moving, first lifts up a hind-leg, leans its body forward, and then lifts up the fore-leg on the same side as the hind-leg it first moved; thus the centre of gravity is advanced. The other hind-leg is next moved, then the fore one on the same side, progressing in this way forward. In trotting he lifts and puts down two feet at once, those diagonally¹ opposite. In galloping he lifts and sets his feet down one by one, though the two fore and hind feet are set down nearly at the same time.

"Mechanics and Mechanism," by R. S. BURN.

1. BALLAST, heavy matter placed in the hold of a ship to keep it steady when it has no cargo.

2. SCALE-BEAM, a graduated, ladder-like measure. (Lat. *scala* a ladder.)

3. ITINERANTS, persons who have no fixed abode, but travel from place to place. (Lat. *itineris*, of a journey.)

4. **PRECARIOUS**, uncertain, because depending on the will of others, and obtained by prayer or entreaty. (Lat. *precor*, to pray.)

5. **INERTIA**, that property of matter, by virtue of which it cannot change its state, whether of rest or motion. (Lat. *iners*.)

6. **CENTRIFUGAL**, a tendency to fly off from the centre. (Lat. *centrum*, centre, and *fugio*, to flee from.)

7. **DIAGONALLY**, passing through the corners, or between two angles not adjacent.

SIMPLE MACHINES.

A **SIMPLE** machine is an instrument, by which weights can be raised, the resistance of heavy bodies overcome, and motion communicated to masses of matter. It is by the application of *simple machines*, or *mechanical powers*, that man accomplishes many useful undertakings that, without such contrivances, would be beyond his natural strength.

Complex ¹ machines may be traced to be merely peculiar arrangements of simple mechanical powers.

The natural forces or powers at the command of man for producing motion are few, being principally the strength of men and horses, running water, steam, fire, and wind.

It is the ability to regulate, accumulate, and divide the speed of power, and to connect, oppose, and counter-balance different velocities,² that gives the great value of mechanical power to man. Machines do not beget or increase force, they only apply that which has been communicated to them in an advantageous, easy manner.

The power applied must be greater than the resistance, otherwise there would be no motion.

The velocity of a body is measured by the space passed over in a given time.

If we notice the arms of a windmill in rapid motion, the outer parts can hardly be seen; while the parts nearer to the centre of motion can be easily distinguished. Now both parts take the same time to perform their journey round, but from the greater space passed over by the ends in the same time, the velocity is proportionally increased.

See, again, those youthful aspirants at our fairs for a ride on a roundabout, who get between the poles to push it along, giving this labour to purchase the luxury. Those near to the riders have to run with all their might, while those near to the axis move at almost a walking pace.

Time is exchanged for *power*; or, as it is sometimes expressed, "what we gain in power we lose in time." This is termed the law of virtual velocities, or the golden rule of mechanics. Thus, if a person could raise fifty pounds to a certain height in one minute, and by the help of machinery he raises 500 lbs. to the same height, it will be found that the time occupied in lifting up the 500 lbs. would be ten minutes: thus the tenfold increased power has to have a tenfold increased time, or the work of ten minutes could have been accomplished in ten different efforts in the same time.

The primary,* mechanical powers are the *lever*, the *pulley*, and the *inclined plane*. The *wheel and axle* are derived from the lever, the *wedge* and *screw* from the inclined plane.

"*Mechanics and Mechanism*," by R. S. BURN.

1. COMPLEX, complicated, composed of many parts.
2. VELOCITY, swiftness, rate of motion. (Lat. *velox*, swift.)
3. PRIMARY, first, chief. (Lat. *primus*, first, superlative of *prior*, former.)

THE LEVER.

OF all the mechanical powers, the lever¹ is the most simple. It is formed of any strong substance, in the shape of a beam or rod, which rests on a prop or axis called a fulcrum,² which is its centre of motion. There are three kinds of levers. The following is an exemplification of the *first* (fig. 4):—



Fig 4.

In this diagram, l is the lever, f the fulcrum, w the weight. By pressing down the end l , the other end of the lever raises w , the weight; the centre of motion is at f , the fulcrum. In other words, the power of force resting on the prop or fulcrum overcomes the weight or resistance. Thus if the lever be under the centre of gravity of the weight, and the length of the lever from the fulcrum be twice as long as the other part, a man can raise the weight one inch for every two inches he depresses the end of the lever.

Now if the end of the lever be four times the length of the part from the fulcrum to the centre of gravity of the weight, then the power of raising the weight is in-

creased four times ; but the space that the *l* end of the lever will pass through is four times greater.

It will thus be perceived, that if a weight of one stone moves through a space of ten feet, we may raise a weight of ten stones through a space of one foot ; or a weight of ten stones moving through a space of one foot will make a weight of one stone move through a space of ten feet.

Now if a man can raise the weight at the end of the lever, and then the lever be made twice as long, and a boy of half the man's strength can then raise it, the boy will be sooner worn out by fatigue than the man, because the man in the exertion of his strength only goes through half the space that the boy has to pass through. It is stated that "the force of the lever increases in proportion as the distance of the power from the fulcrum increases, and diminishes in proportion as the distance of the weight from the fulcrum increases." It was from this general law that Archimedes³ exclaimed, "Give me a lever long enough, and a prop strong enough, and with my own weight I will move the world."

Should it be desired to know what power will balance a certain weight at the short end of the lever, it is done by multiplying the weight by the length of lever from it to the fulcrum, and then dividing the result by the other length of lever, and the result is the power required : thus if 100 lbs. be on one end of a lever 12 inches from the fulcrum, $100 \times 12 = 1200$; then suppose the long end of the lever be 24 inches, $1200 \div 24 = 50$ lbs., the power required.

A *spade* is a lever, the earth being a fulcrum, in the operation of digging. In Ireland, and on the Continent, they make the spade much longer then that used in England ; and thus a man stands nearly upright when digging. The fisher-girls, who dig for worms as bait in

the sands on our coast, also use a long-handled spade ; this is to compensate for manual ⁴ strength.

In moving barrels and very large weights, and principally on board ships, a *handspike* is the lever found best adapted to the purposes required.

Carpenters, masons, and others who have to move bulky masses of matter short distances, adopt the use of a *crowbar*, which is a lever made of iron, having a claw at one end.

A hammer has usually a claw for drawing out nails. Now in this the power seems great, for the nail will bear an immense weight attached to it ; yet because we move the hand through several inches while the nail moves only a very short way, we can draw it out, and thus the velocity overcomes the resistance.

The fire-poker is a lever, having the bar of the grate for a fulcrum.

The simple lever has sometimes two arms ; it is then called a double lever. Scissors are of this kind, having the rivet as a fulcrum for both levers. Large scissors, called shears, used in cutting cloth, pasteboard, tin, copper, and sheets of iron, are double levers.

Nippers, pincers, forceps, snuffers, are all of this description of levers.

The *scale-beam* used in weighing is a simple lever. The arms *a, a* (fig. 5) are made of equal length, and suspended over the centre of gravity. The axis or pivot *b*, which is the point of suspension, is sharpened to a very thin edge, sometimes

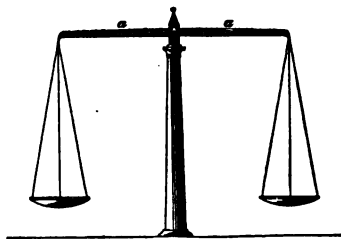


Fig. 5.

equal to that of a razor, that the beam may easily turn with as little friction as possible, when weights are placed in the scales. Should the arms not be of equal length, then the scales cannot act justly, although the beam may seem fairly balanced and the weights true; but if one was half an inch longer than another in an arm of eight inches in length, the customer would lose more than an ounce in every pound. The deceit can be discovered by changing the weight and material to the opposite scales.

In some cases where the beams of scales are not accurate, the articles to be weighed are put in and balanced by shot, sand, or other things. The things, of which it is desired to know the weight, are then removed, and weights put in their place; thus the true and exact weight is known. By this mode almost any elastic substance may answer the purpose of a weighing-beam. Suppose a piece of steel, or a walking-stick that will bend, were held over a place, and a substance attached to its end; then when so attached, mark exactly the place the stick or steel bent to when the substance was on it; remove the thing to be weighed, and attach weights until the steel or stick bends again to the mark, and then the weight of the material is truly found.

Some persons use instead of the weighing-beam an instrument called a *steelyard* (fig. 6), which is a lever with arms of unequal length. The lever is suspended from a hook *a*, which is the fulcrum or pivot, and from which the steelyard must truly balance; thus it is its centre of gravity. Thus one pound weight will weigh any number of pounds in the scale that the yard is long enough to perform. In the diagram the one pound weight at *c* is weighing eight pounds in the scale at *b*, for the space, over which it is placed on the long arm of

the lever, is eight times that of the short arm. By dividing the spaces in the long arm into halves, quarters,

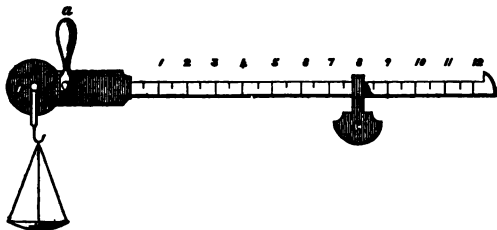


Fig. 6.

and sixteenths, then half pounds, quarters, and ounces can be weighed.

The second kind of lever is that where the weight and the power are on the same side of the fulcrum, the power being furthest from the fulcrum.

Thus, if a mason (fig. 7) desires to move forward a large



Fig. 7.

piece of stone, instead of bearing down upon the lever to raise it up a little, he sticks his crowbar into the ground, and pushing upward, moves the stone little by little *onward*, the ground being the fulcrum.

A wheel-barrow affords another example. In using it, a point in the wheel of the barrow pressing on the ground is the fulcrum; the load is the weight, and the handles held by the man the power. As the person shortens or lengthens his hold on the handles, so does he move the centre of gravity to the wheel or himself.

If two men carry a load slung from a pole resting on their shoulders, and the load be in the middle between them, they have an equal share of the weight; but in proportion as it is more towards one than the other, so is the extra amount of weight to the one nearer to it. The men are the fulcra in this case; they act in that capacity the one to the other, while both supply the moving power. Should the pole be 8 feet long, and the weight 200 lbs., each man will bear 100 lbs. weight. Suppose that a man and a boy are set to carry this weight, and the man, from the boy's inability to carry his equal share, out of humanity, places the weight three times as far from the boy as from himself; that is, 6 feet distance from the boy, and only 2 feet from himself, then the boy will only have 50 lbs. weight, while the man will have 150 lbs. to bear.

A hand-barrow is on the same principle, and one man may bear less or more as the load happens to be placed, or as the handles may be held to increase or lessen the lever.

The common operation of opening a door is an illustration of this lever: the hinges are the fulcra or centre of motion, the door is the resistance or weight, and the hand the moving power. The finger is painfully nipped when caught near the hinge, from that part being near the fulcrum, acted upon by a lever passing through a larger space. In opening a box the same thing is noticed.

The oar of a boat is also a lever of this kind, the water being the fulcrum, the person who rows the power, and the boat the resistance or weight. This lever is most powerfully employed in the coal-barges on the rivers in the north of England. These vessels retain the old Saxon name of keels, which is the term that distinguished the ships containing Horsa and Hengist, and their enterprising followers, on first coming to this country. They are in the form of half a walnut-shell, huge and unwieldy, and contain upwards of twenty-one tons of coals. The keel is propelled with one immense oar, wielded by three men remarkable for their muscular powers; they pull with all their might, adding the entire weight of their bodies. They do not sit, but move backward with the motion of the oar. Thus this heavy, clumsy barge has but the yielding water for a fulcrum, and yet is skilfully managed even among the waves of the ocean.

The *masts of a ship* act as levers, having the cargo or ballast and the vessel as the resistance, the bottom of the vessel as the fulcrum, and the sails holding the wind as the moving power. Thus well-equipped smuggling vessels and gentlemen's yachts, the masts of which seem enormously long for the size of the vessel, lean over in a perilous manner when in full sail, in consequence of the pressure on the levers.

Nut-crackers, lemon-squeezers, &c., are also illustrations of this kind of lever. The two legs are joined by a hinge, which is the fulcrum, the article placed between is the resistance, and the hand is the power.

The *rudders* of boats, ships, &c., are levers acting on the same principle.

Many are the industrial purposes to which this form of the lever is applied by chemists, grocers, chaff-cutters,

coopers, patten-makers, &c., &c. The wooden soles of the shoe called a *clog*, at one time almost universally worn by boys and countrymen, were formed by this cutting lever. In snowy or wet weather, or where persons' avocations compel them to work amid wet or stand on cold stones, this ancient shoe is invaluable in the preservation of health, being warm and dry.

A cutting-lever is a common appliance in the country for bending down haystacks partially cut, and other loose light bodies that might be carried away by the wind ; and it is even retained in some places for pressing cheese when in course of manufacture. A pole is stuck into the wall as a fulcrum, the resistance is the object to be pressed or held in its place, and at the other end are hung weights as the power.

The *third* description of lever is that in which the fulcrum is at one end, the weight at the other, and the power placed between them. At one time this was called the *losing lever*, because the power had to be greater than the weight. The advantages of it are now discovered and appreciated, consisting, as it does, in a small power causing the extreme point of a long arm to move over a great space ; and it is one of those wonderful adaptations of the Divine Being in the construction of the appropriate mechanism of animals and man.

The mechanical power of the muscles of man, acting on the bones as levers, is one of a surprising nature in the combination of power, velocity, and beauty of construction. In the arm the elbow is the fulcrum, the muscles the moving power, and the weight raised the resistance. Thus, if the weight raised be 50 lbs., and the elbow passes through a space of 20 inches, the muscles springing from the shoulder will contract 1 inch, and the force be equal to 1000 lbs. The muscles being

near the joints or fulcra, give great velocity to the other end of the lever, generating great momentum.⁵ In the human body, sometimes the fulcrum is between the power and resistance, as the elbow between the muscles of the shoulder and humerus,⁶ and the hand with the weight. In other places the resistance is intermediate, and the fulcrum at the end, as the toes on the floor, and the hinge of the lower jaw ; and in parts the fulcrum is at the end and the power intermediate, as the weight of the arm has its fulcrum in the shoulder-bone, and the power is in the muscle covering and proceeding from the shoulder.

“*Mechanics and Mechanism*,” by R. S. BURN.

1. LEVER, that which lifts or raises. (Lat. *levo*, to raise.)
2. FULCRUM, a prop or support, the fixed point on which a lever moves. Plural, fulcra. (Lat. *fulcio*, to prop.)
3. ARCHIMEDES, a celebrated geometrician, born at Syracuse 287 B.C. He attended the lessons of Euclid, and gained great distinction by his discoveries in mechanics, engineering, &c.
4. MANUAL, pertaining to the hand ; a thing done, made, or used by the hand. (Lat. *manus*, the hand.)
5. MOMENTUM, the quantity of motion in a body. (Lat. *moveo*, to move.)
6. HUMERUS (Lat. the shoulder).

THE WHEEL AND AXLE.

THIS simple machine consists of a wheel *w* fixed upon an axle *a*. Suppose it took 3 inches of rope to go round the axle, and 1 foot of rope to go round the wheel, then the proportion would be as 1 to 4, and a weight of 1 lb. at the wheel, would support a weight of 4 lbs. at the axle. If the rope be wound round the axle in a different direction from that on the wheel, and an increase of weight be attached to the rope at *w*, then it would unwind and the

weight descend, while the rope on the axle would wind up and lift the weight fastened to it. Thus one power is made to act against another, as pointed out in the lever.

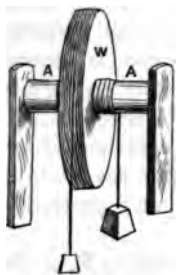


Fig. 8.

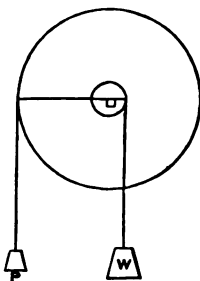


Fig. 9.

The wheel and axle are called a perpetual lever. In the diagram it will be seen how the term may properly be applied. The power p is the weight hanging from the wheel, the fulcrum is the centre of the axle, and the weight to be raised is that hanging from the axle. Now, if the distance from the edge of the wheel to the centre of the axle be 8 inches, and from the centre to the edge of the axle be 1 inch, and 1 lb. be the power hanging from the wheel, it will balance 8 lbs. hanging from the axle. A slight addition of power, then, would raise up the 8-lb. weight; but for every inch the weight rises, the power would descend through 8 inches of space. A handle inserted would act the same as a wheel. A lever would only raise the weight through a small space, while the wheel and axle will act as long as the length of rope will allow.

The larger the wheel and the smaller the axle the more powerful is the machine, but the greater time is taken in raising the weight.

In the *gin* used at collieries of small depth, in thrashing machines, sand and plaster mills, and various other useful occupations of commercial industry, this principle is of infinite service.

In the common method of drawing water from a well, the handle is made to describe a large circle, and thus performs the part of the wheel described, while the axle receives the rope with the weight. When the well is very deep, and the rope overlaps several times on the axle, then the operator finds, as the bucket approaches the top, that more and more power has to be applied. The cause of this is that the rope winding upon itself increases the circle on the axle, while the handle describes the same motion through space; and as a larger axle requires more power, the weight feels augmenting.

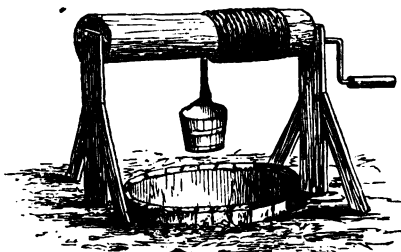


Fig. 10.

That punishment accorded to petty offenders, the *treadmill*, is a large wheel having the outer parts arranged so that the condemned turn it round by lifting their feet as if stepping up stairs, which, by the weight of their bodies, pass from under them: the axle of the wheel is connected with apparatus for grinding sand or other things. Cranes at one time were worked on this plan, but the men were inside the wheel instead of outside; the clumsy contrivance has given way to other more compact inventions. Some cages for birds, mice, and squirrels are formed in the same manner.

The *windlass* used on board ships for raising the heavy anchors, and the *capstan* (fig. 11), are wheels and axles,

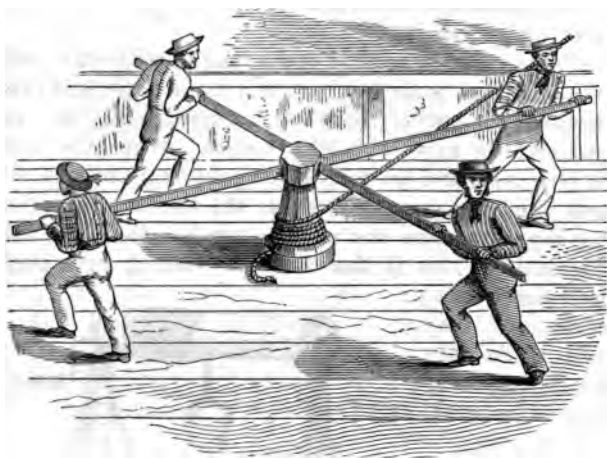


Fig. 11.

the latter being upright. The head or drum has holes in it, in which are placed levers, or capstan-bars, against which the men push. They may be likened to the spokes of a wheel, but are made movable; this causes the size of the wheel to be considerably enlarged, describing a large circle. If a capstan-bar be six times as long as from the edge to the centre of the part on which the rope is coiled, and six men are at six bars, they will raise thirty-six times as much weight as one man could do by his unassisted strength. Capstans are used to open and shut dock and canal gates, drawbridges, &c.

The handle applied to a coffee-mill, a draw-well, a crane, or a grindstone, may properly be called a *winch*; in fact, wherever a circle is described by the hand, it is

of little consequence whether there be one or more spokes or handles—the principle is the same.

“Mechanics and Mechanism,” by R. S. BURN.

THE PULLEY.

THIS simple machine is a small grooved¹ wheel, called a *sheave*, made of hard wood, with a rope passing over it, fixed in a scooped-out *block* of wood, moving round a pin passing through its centre. Sometimes they are made of brass, iron, and china-clay.

A *fixed pulley* (fig. 12), with two equal weights at the

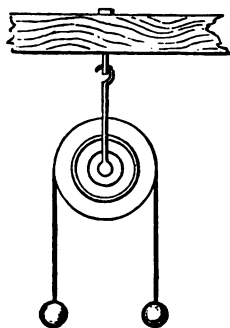


Fig. 12.

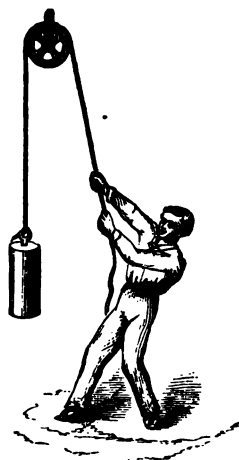


Fig. 13.

ends of the rope passing over it, gives no mechanical advantage; for the weights balance, and when moved, they rise or fall through an equal space in the same

time. The service to which it is applied is merely to change the direction of the power; and it enables a man to stand on one spot and raise a weight which he might otherwise have to carry up a ladder. Another use is that of enabling several men to join their strength at one time in raising a considerable weight.

The pulley forms one of the most valuable assistants to the toiling and hardy sailor, and by its means fewer men are required to do the necessary work of the ship. It is hung about all parts of the rigging, and is ever a ready helpmate. By its means, amid calms or storms, the weather-exposed mariners can stand on the decks of their ships and hoist the booms, spars, and sails of the loftiest vessel that the ocean bears on its bosom.

A man, by placing himself in a loop of a rope passed over a fixed pulley (fig. 14), may by his own strength raise himself up or lower himself down as he pleases. This is sometimes practised by workmen when slight repairs have to be done to the front of large mansions. For safety, one end of the rope is fastened round the body. If moveable blocks be added, the ascent and descent are very easy. The reason of this being accomplished with a fixed pulley is, that the man throws more than half his weight by his strength on one side of the pulley, which causes that side to descend, while the other part, with the loop in which he sits, rises.

A moveable pulley *f* (fig. 15) is sometimes fixed to the weight *b*, which has to be lifted, and rises and falls with it; the rope passes under it, having the pulley hanging upon it. It is plain that the weight must be equally borne by both sides of the rope, the one end fixed in the hook, and the other held by a man at *a*; as to its passing over the fixed pulley at *d*, that is only of use as a convenience in giving direction to the rope. Then be-

tween the hook and the man there must be action and reaction, which being equal and contrary, as before explained, the weight becomes divided. If the weight were 8 stone, the man has only to bear 4; still he must draw up 2 feet of rope, that is, 1 on each side of the pulley, to raise the weight 1 foot; hence it is very evi-



Fig. 14.

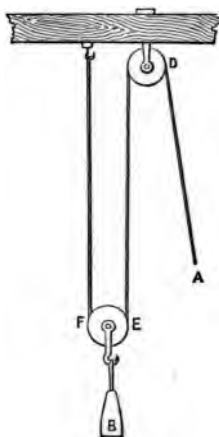


Fig. 15.

dent that in doing so he lifts 4 stone 2 feet; that is, though the weight has passed through only 1 foot, yet he has pulled the rope 2 feet. But then the weight he pulled at during the time was only 4 stone; without the pulley he would have had 8 stone to raise 1 foot; thus the weight was one-half, but the space he pulled through double to the movement of the weight.

To increase the advantages of the pulley, several are combined together. In fig. 16, there are two fixed pulleys and two moveable ones; thus the rope, it will be

observed, passes four times over them, and the resistance capable of being overcome is as 4 to 1; that is, if a power of 100 lbs. was applied, it would be equal to a weight of 400 lbs. to be raised.

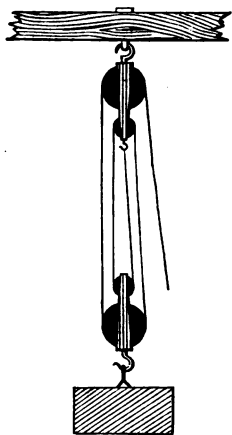


Fig. 16.

Each fold of the rope bears a fourth of the weight, the last being the power applied; that over the top fixed pulley is of no more use than to aid the person pulling the rope to give it a proper direction.

Thus, then, an increase of pulleys decreases the weight, and allows a smaller power to overcome a larger; still it is always at a loss of time and space.

The ropes used about a pulley are called tackle, and the pulleys blocks; therefore when a sailor or workman collects to-

gether all necessary for the application of this machine he speaks of the *block and tackle*.

"Mechanics and Mechanism," by R. S. BURN.

1. GROOVE, a furrow; that which is graven or hollowed out.

THE INCLINED PLANE.

THIS is another of the primary mechanical powers, and is of use to man in many of his daily occupations of raising or lowering weights short distances, as it gives to a small power facility in overcoming a larger.

If a cask be on a flat surface or plane, it will be at rest

any part of it where it may be laid ; but had a man lift it on to a cart (fig. 17), he would have to apply a power equal to its weight to prevent it falling upon the ground. Were he, however, to place a plank to the bottom of the cart, he then makes an inclined plane, and he need only have a part of the weight of the cask

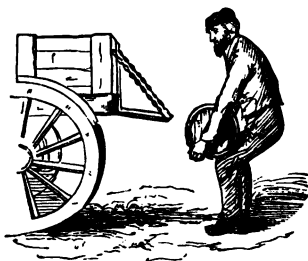


Fig. 17.

to support (fig. 18). Or had the man to load the cart with casks, he might have to lift them from the ground perhaps 4 feet ; but by placing a plank 8 feet long, and forming an inclined plane, he can roll them



Fig. 18.

with one-half the power he would have to exert when lifting them ; yet he would be double the time, as the distance would be twice that of the height. An inclined plane, then, is seen to be a slope, and according to its

height will the time be of a body in rolling down it. Thus, if it be 16 feet high at one end, and its length be 32 feet, a cannon-ball or cylinder will, by the force of gravity, fall through the 16 feet in 1 second, but to roll down the incline it would take 2 seconds; if it were 64 feet high, and the inclined plane were twice 64, or 128 feet long, then a ball would fall through the space or height in 2 seconds, but would take twice two, or 4 seconds, to roll down the incline.

Thus this mechanical power is in proportion as the length of the plane exceeds its height; and if a cask weighing 3 cwt. had to be rolled into a cart or part of a warehouse 4 feet high, and a plank 12 feet long was used, then a power of 1 cwt. would balance it, because the inclined plane is three times the perpendicular height. A slight power over the hundredweight would move the cask onward.

If a loaded cart, omnibus, or coach, on a plane at the bottom of a hill, had a plummet-line hung from the top, it would fall straight to the ground; but as the vehicle moved up the hill, the steeper it became the more the plummet would fall towards the back of the conveyance, and the heavier the load would become to the horse, increasing the difficulty to the animal in dragging it up the hill.

If the rise be 1 foot in 20 on a road, the horse has to lift the 1-20th of the load, as well as to overcome the friction and gravity; because in 20 feet the load has to be raised up a height of 1 foot, and the weight to be overcome at any part of the 20 feet is the twentieth of what it would be if raised that height at once, being gradually lifted, as it were, the twentieth part at a time over the 20 feet. The greater or less the slope, the greater or less power is required to overcome the resistance. It is this

reason that causes drivers, on ascending steep hills, to wind from side to side, by which the incline is made less.

On railways, a locomotive engine can draw a train and 700 persons 22 miles an hour, up an incline of 3 inches in every 8 feet; but were the incline 1 foot in 12 feet of length, then the engine could not move forward.

In the coal districts the inclined plane is of common occurrence on the railways. It is a curious sight to see twenty loaded waggons, set off from the top of a hill, rushing down towards a river, without anything but a rope attached to the last one; this rope is attached to a small wheel or drum, and while the loaded waggons descend by their weight and velocity, empty ones on a parallel line are drawn upwards.

In building houses an inclined plane is often used for the easy transit of wheel-barrows; and it is believed that the ancients, in erecting their immense works of art, used inclines formed of mounds of earth.

The inclined plane is beautifully illustrated in that exciting and pleasing sight, the launch of a ship. Whether the destiny of the splendid triumph of man's handicraft be war or commerce, still it strikes with awe, wonder, and gratification to see it move majestically down the sloped ways, breast all opposition, and then settle buoyantly and calmly on the surface of the waters.

To the drayman, in unloading ponderous hogsheads, the inclined plane is of great use; and again, when he drags the empty butts from the cellar, he places down a plank or two, puts a hook into the bung-hole at the end, fixes a rope to one of his horses, which he drives on, and up pops the barrel.

The stairs of a dwelling-house are in principle an

inclined plane, having steps to allow of a footing. This forcibly struck us once on seeing a Highlandman who had never been in any other habitation than a cabin. He mounted the stairs well enough ; but when about to return, after looking at them for a moment, he sat down, and descended as we would a steep declivity having footholds cut in it.

When roads are made to the tops of high hills, they are either wound round and round, or made so broad as to allow of tacking from side to side.

Chisels, adzes, and other tools which are sloped only on one side, are in principle inclined planes.

"Mechanics and Mechanism," by R. S. BURN.

THE WEDGE.

THE wedge (fig. 19) is in the form of two inclined planes, abc and dbc , joined at their bases. It is used to rend wood, rocks, &c., also to raise heavy weights short distances, and compress substances closer together. More power is gained by striking the head of the wedge with a hammer, either small or large, than by

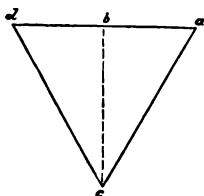


Fig. 19.

pressure, as the momentum of the blow seems to shake the particles of matter, and cause them to separate. A thin wedge requires less power to move it forward than a thick one, less resistance being offered, as in the case of an inclined plane. The power of the wedge cannot be correctly estimated, as the force, number of blows, and incline have all to be taken into account.

In splitting wood (fig. 20), the sides of the opening act as levers, and thus rend the parts in advance of the point of the wedge.

The wedge is useful in dockyards, where large vessels are raised by its agency.

The heads of hammers are fastened on by wedges driven in at the part of the handles near the heads.



Fig. 20.

Nails, knives, awls, needles, swords, razors, hatchets, chisels, and other similar instruments, are in their operations on the principle of wedges. A saw is a series of wedges, which act by drawing them along, and pressing them on the object to be cut. When the edge of a razor is examined by a microscope it is seen to be a saw in formation, which, by being drawn along the beard, enters the hair, and thus cuts it off. A scythe acts in the same manner on grass. The saw-nature of fine edges may be illustrated by pressing the thumb against a sharp penknife; the skin is not cut, but the slightest movement of the edge across the skin immediately cuts it. *"Mechanics and Mechanism,"* by R. S. BURN.

THE SCREW.

THE screw is placed under the heading of simple machines, but it cannot be used without the applica-

tion of a lever or some other contrivance, when it becomes a compound engine of great power either in pressing bodies closer together or in raising great weights.

A screw is in principle a projecting inclined plane *bb* (fig. 21) winding round a cylinder *aa*; for were it un-

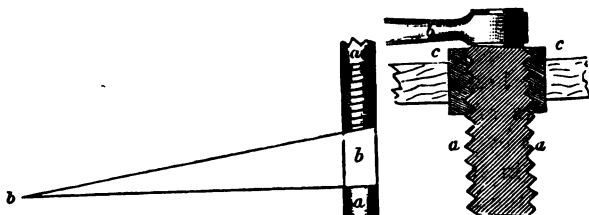


Fig. 21.

Fig. 22.

wreathed, it would form an inclined plane, the length of which would be to its height as the circle of the cylinder is to the distance of one incline or thread, as they are called, from the other. This spiral thread or screw *aa* (fig. 22) works in another which is cut in the inner surface of a hollow cylinder *cc*, called a nut or box. This portion is generally fixed. The one is formed exactly to fit the other. A lever *b* is placed in the head or other part of the screw, and every turn carries it forward upon the nut or box, or draws it upon it to the extent of two turns of the thread. If the circle of the screw be 3 inches, and the distance of the threads $\frac{1}{2}$ an inch, then the power gained will be as 6 to 1, as seen in the inclined plane; the height raised will be $\frac{1}{2}$ an inch, but the whole cylinder, 3 inches or 6 half inches, has been passed over by the power, while the weight has only moved $\frac{1}{2}$ an inch. Thus it is as 1 to 6 of power gained. But as the distance apart of the

threads of the screw is lessened, so is the power increased. Suppose the distance of the threads apart to be $\frac{1}{4}$ of an inch, and this to be turned by a lever 36 inches long, then the circle described by the lever will be about 216 inches, which, multiplied by 4, for the $\frac{1}{4}$ inch of the screw, gives 864 for the power gained, being 864 times as great as the distance between the spirals; therefore a power of 1 lb. at the lever would balance 864 lbs. acting against the screw, and the velocity of the power will be to the velocity of the weight as 864 to 1. Saying a man's pull or pressure is equal to 120 lbs., and four men are employed at the lever, then the pressure would be 864 multiplied by 120 four times over, equal to 414,720 lbs.

Formerly, in the paper mills where it was requisite to have an enormous pressure, the lever was frequently sixteen or twenty feet long, worked by eight or ten men assisted by a winch and pulleys.

A corkscrew is a screw without a central spindle or cylinder.

The screw is applied in pressing books, letters, &c. (fig. 23), in packing light substances, as cotton, flax, and blankets, by which they are made to occupy a comparatively small space; also in wine-making to squeeze the grapes, in cheese-making, and by the smith, carpenter, turner, and other artisans.

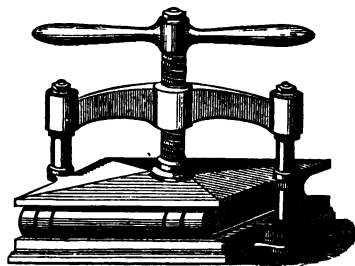


Fig. 23.

It has also been the power on the principle of which the hand printing-press has been made. To effect the

operation of printing with rapidity, the thread of the screw is made very wide, and others placed between, so that there are three screws ; the great incline of the plane giving velocity, and the number of screws power. Thus, in a moment, by a pull at the press-bar or lever, a pressure of a ton is given on the paper and type.

The screw is the means by which coin is formed, letters copied, and dies imprinted on letter paper and envelopes. The beautiful embossed boards displaying great artistic taste in design and execution, so much used in the elegant ornaments conceived by ladies for the adornment of the drawing-room, are impressed by a large and much inclined screw, similar to that of the printing-press, having a huge horizontal wheel as a lever power, swiftly turned by the strength of several men.

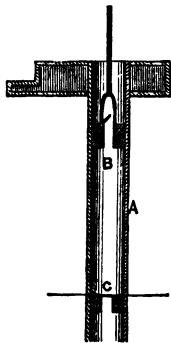
The screw also regulates many of the instruments of the mathematician, astronomer, operative chemist, and engineer, and is an invaluable assistant to the maker of delicate instruments, as by certain turns he can adjust his tools so as to mark in an inch a hundred thousand lines, the exactitude of which is all-important in the pursuit of scientific truths.

"Mechanics and Mechanism," by R. S. BURN.

PUMPS.

A PUMP, in the common acceptation of the term, is a contrivance for raising fluids by atmospheric pressure. There are three kinds of pumps used for raising water, of all of which there are various modifications. The simplest and most common pump is the ordinary lift, or sucking, or household pump.

s of great antiquity, its invention being ascribed
 ebes¹ of Alexandria, about 120 B.C. The annexed
 is a section of the common
 pump. This pump consists
 ollow cylinder,² A, of wood or
 which contains a piston,³ B,
 so as to move up or down in
 linder easily, and yet be air-
 to this piston there is attached
 which will reach at least to
 p of the cylinder, when the
 is at the bottom. In the
 there is a valve which opens
 ls, and at the bottom of the
 r there is another valve C,
 ing upwards, and which covers
 fice of a tube fixed to the bottom of the cylinder,
 aching to the well from whence the water is to be



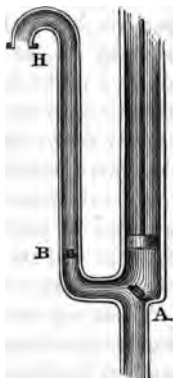
This tube is commonly called the *suction* tube,
 e cylinder the *body* of the pump.
 n the piston is at the bottom of the cylinder,
 an be no air, or very little, between it and the
), for as the piston was pushed down, the valve in
 ld allow the air to escape, instead of being con-
 , and when it is drawn up, the pressure of the air
 would shut the valve, and there would be a vacuum
 ed in the body of the cylinder, when the piston
 l at the top. But the air in the cylinder being
 uch rarefied, the pressure of the valve C on the
 at the bottom will be greatly less than that of
 ternal atmosphere on the surface of the water
 well; therefore the water will be pressed up the
 to a height not exceeding 32 or 33 feet.
 he valves shut downwards, the water is prevented

from returning, and the same operation being repeated, the water may be raised to any height, not exceeding the above limit, in any quantity. The quantity of water discharged in a given time is determined by considering, that at each stroke of the piston a quantity is discharged equal to a cylinder whose base is the area of a cross section⁴ of the body of the pump, and height the play of its piston. The piston, throughout its ascent, has to overcome a resistance equal to the weight of a column of water, having the same base as the area of the piston, and a height equal to the height of the water in the body of the pump, above the water in the well.

The lifting-pump. This pump, like the suction-pump, has two valves and a piston, both opening upwards; but the valve in the cylinder instead of being placed at the bottom of the cylinder, is placed in the body of it, and at the height where the water is intended to be delivered. The bottom of the pump is thrust into the well a considerable way, and if the piston be supposed to be at the bottom, it is plain that, as its valve opens upward, there will be no obstruction to the water rising in the cylinder to the height which it is in the well, for by the principles of Hydrostatics,⁵ water will always endeavour to come to a level. Now when the piston is drawn up, the valve in it will shut, and the water in the cylinder will be lifted up; the valve in the barrel will be opened, and the water will pass through it, and cannot return, as the valve opens upwards;—another shake of the piston repeats the same process, and in this way the water is raised from the well; but the height to which it may be raised is not in this, as in the suction-pump, limited to 32 or 33 feet. To ascertain the force necessary to work this pump, we are to consider that the piston lifts a column of water, whose base is the area of the piston,

hose height is the distance between the level of water in the well, and the spout at which the water is discharged.

In the *forcing-pump* the piston has no valve, but there is a valve at the bottom of the cylinder, seen at A. Opening into the side of the cylinder is another tube, which is bent upwards to the height to which point the water is to be raised; and in this tube, just above the valve of A, is a second valve, B, which opens upwards. When the piston is raised, the valve in the bottom of the cylinder opens, and a vacuum being created, the water is pressed up into the cylinder on the principle of the sucking-pump. But when the piston is pushed down, the valve A at the bottom shuts, and the valve B at the side which leads to the ejection-pipe opens, and the water is forced up the pipe. When the piston is raised again, the valve B shuts and the valve A opens. The same process is repeated, and the water is thrown out at every descent of the piston; the discharge therefore is not constant.



Popular Encyclopædia.

PTOLEMY, or Ctesibius, celebrated for his mechanical inventions in Alexandria in the reigns of Ptolemy Philadelphus, and Ptolemy Euergetes, about B.C. 250.

CYLINDER, a solid, or hollow, roller-like body of uniform diameter, whose ends are equal parallel circles.

PISTON, a short solid cylinder, fitting and moving up and down by means of piston rod, within a large, hollow cylinder.

SECTION, a division, the plan of an object cut through, as it shows its interior. (Lat. *seco*, to cut.)

HYDROSTATICS, the science relating to the statics or equilibrium of water. (Gr. *hydor*, water.)

METEOROLOGICAL INSTRUMENTS, AND WHAT THEY TELL US.

THE appearance of a barometer¹ is familiar to most persons, but although the instrument is very commonly used, at sea, as well as on land, comparatively few are able to understand much about what it tells us. The general opinion is, that the *rise* of level of the mercury usually shows that there will be less wind or rain; its *fall* that more wind or rain may be expected; that when the level remains steadily high, a long spell of dry weather is probable; while when the level is low the weather will be wet and unsettled, and a sudden change may be looked for.

These conclusions are correct in many cases, but they require modification in many others, for there are other matters besides mere barometrical indications to be taken into consideration, so that in some instances the barometer taken by itself is wholly misleading. To aid in forming a judgment as to probable weather, three instruments are essential—the barometer, the thermometer,² and the hygrometer,³ and we shall give a short explanation as to their nature and object.

Briefly we may say that,—

- (1.) The barometer shows the pressure of the air.
- (2.) The thermometer (in the shade) shows the temperature of the air.
- (3.) The hygrometer shows the degree of moisture present in the air or its dampness.

The Barometer, in its simplest form, consists of a glass tube closed at one end, which is filled with pure mercury, and is a little less than three feet long. It is placed, standing upright, with the open end downwards, in a

cup or cistern partly filled also with mercury. If this be done carefully, without allowing any air to get into the tube, the level of the mercury in the tube will sink until it stands at a height of about thirty inches above the surface of the mercury in the cistern.

The space in the tube above the top of the column of mercury is then empty, forming what is called a vacuum.

In general terms it may be said that the level of the mercury in the tube rises when the air becomes heavier, falls when it becomes lighter, and remains at rest when it is unchanged in weight.

Atmospherical Pressure. Air like all other substances has weight, and the atmosphere presses on everything at the surface of the earth, with a force or weight of nearly fifteen pounds on a square inch of surface. We do not feel this as a burden upon us, because the tissues of our bodies allow the air to permeate⁴ through them, and so the air in them supports the pressure of that outside them. Accordingly, we see that the air presses on the surface of the mercury, in the cistern of the barometer, with a force of about fifteen pounds; on the square inch, and consequently it will keep up such a column of mercury in the glass barometer tube, standing in that cistern, as will press on the same surface with an equal downward force. Now, a cubic inch of mercury weighs about half a pound, so that thirty cubic inches weigh about fifteen pounds. Accordingly a column of mercury thirty inches in height, in the tube, will press on the surface of the mercury in the cistern with a force of about fifteen pounds on the square inch, or with the same force as the air outside the tube does. Every change which occurs in atmospherical pressure will be shown by the rising or falling of the mercury in the tube. If the liquid in the

barometer were water instead of mercury, the column required to balance the pressure of the atmosphere would be thirteen and a half times higher than the column of mercury, because mercury is thirteen and a half times heavier than water. Water barometers have been made in this way, but they are not so handy or useful as mercurial barometers. However, in making an ordinary pump, use is made of the fact that the pressure of the atmosphere will support a column of water in an empty tube the lower end of which is plunged in water. The sucker draws the air out of the pipe, and the water is forced up out of the well after it by the pressure of the atmosphere on the surface of the water round about the pipe, so that in a good pump, which "holds its charge," the water would, if required, stand at a level of more than thirty feet above the surface of the well below.

Effect of elevation above sea-level. It must be remembered that it is only at the level of the sea that the column of mercury in the barometer stands on the average at the height of 30 inches. If the instrument be placed on the top of a hill there will be a lesser thickness of air above it, and if at the bottom of a mine a greater, than there is at sea-level; so in the former case the average height of the column will be less, and in the latter greater than 30 inches. It is most important to bear this in mind, for the difference in the height of the column amounts to more than a tenth of an inch for each hundred feet of elevation above the sea or depression below it.

Motion of the Barometer. The barometer is commonly said to be falling when the level of the mercury in the tube is sinking (at which time its surface is frequently slightly concave or hollow), or when the hand of a wheel barometer or aneroid^s moves to the left. On the

other hand, the barometer is said to be rising when the level of the mercury in the tube is rising (at which time its surface is usually convex or rounded), or when the hand of a wheel barometer or aneroid moves to the right.

Graduation of scale. The scale for reading the barometer is divided into inches and tenths. For yet greater precision a sliding-scale called a "vernier" is attached. By means of this contrivance, readings to hundredths and even thousandths of an inch can be obtained.

Barometrical range. In both temperate zones, and therefore in these islands, the mercury at sea-level ranges or rises and falls, through a space of about three inches on extraordinary occasions, namely, between thirty-one inches (31.0) and twenty-eight inches (28.0), or even a little lower. An uninterrupted fall exceeding an inch and a half (1.5) is very rare in this country. The usual range is from 30.5 in. to about 29.0 in. In the torrid zone, or near the equator, the mercury usually ranges only through the space of a few tenths, but on extraordinary occasions, such as the very severe storms called hurricanes or cyclones,⁶ the level sometimes falls as low as 27.0 inches.

A barometer tells more about wind than rain. The barometer, feeling the pressure of the air, shows at once when that pressure is changing in amount. If, owing to any cause, the pressure at one place on the earth's surface be greater than at another, the air has a tendency to move from the place where the pressure is greater towards that where it is less, and thus *wind* is caused. Hence we see that the barometer shows pretty accurately, when wind may be expected. A change of weather comes almost always with a change of wind, and the extent of this change of weather depends on the fact of the new wind being

warmer or colder, damper or drier, than that which has been blowing. Now because landsmen generally, such as farmers and gardeners, care more about rain or snow than about wind, many people have fallen into the habit of looking at the barometer in order to see whether the weather is going to be wet or fine, without thinking from what point the wind is blowing. Used in this way, the instrument will be at least as likely to mislead the person consulting it as to guide him aright. The barometer has but two motions, *rising* and *falling*, by which to indicate all changes of weather ; and any conclusions drawn from its movements must be checked by observations of temperature, moisture of the air, present direction and force of wind, and state of the sky, before any correct opinion can be formed as to what may be expected.

The thermometer shows heat and cold, but does not show the pressure of the air in any way. A thermometer consists of a long glass tube of very small bore, closed at one end, and having a small glass bulb filled with mercury at the other. Almost all substances expand when they are heated, and contract when they are cooled. Mercury is very much affected in this way, much more so than the glass which contains it, so that when the thermometer is heated, the mercury in the bulb expands, and a portion of it is forced into the tube, when the thin thread of mercury in the tube becomes longer ; when the instrument is cooled the mercury contracts, and the thin thread becomes shorter, as part of it is drawn back into the bulb. Thus, then, the thermometer shows, by means of the length of the thread of mercury, the temperature of the place where it is at the time.

Graduation of a Thermometer. The scale of a thermometer is divided into degrees. There are two fixed points in it, viz., that at which ice melts, and that at which water

boils. In the thermometer in use in England, namely, that designed by Fahrenheit, the distance between these points on the scale is divided into 180 degrees. The point at which ice melts is 32 degrees, and that at which water boils, when the barometer stands at 30 in., is 212 degrees.

Range of temperature. The usual range of a thermometer in the shade in the open air is about seventy degrees in England, viz., from 10° to 80° . In very hard frosts the temperature sometimes falls below 10° , and on very hot summer days it rises above 80° .

If the sun shines on the instrument, the mercury rises much higher. The range of the thermometer is greater in other countries, especially in the United States and Canada, where the winters are much colder and the summers hotter than they are in this country.

The hygrometer measures the dampness of the air. There are several kinds of hygrometers, but the easiest to make and to manage consists of a pair of thermometers placed near each other and arranged as we are about to describe.

If a thermometer be fitted with a piece of linen fastened tightly round the bulb, and this be kept damp by means of a few threads of darning cotton or lamp wick, passed loosely round the bottom of the stem so as to touch the linen coating, and with their low ends dipping into a cup of water placed close to the thermometer, it will in general show a temperature lower than that shown by an ordinary thermometer.

A thermometer so mounted is called a damp or wet bulb thermometer, to distinguish it from an ordinary thermometer which has its bulb dry.

Principle of the instrument. The reason that the wet bulb thermometer reads lower than the dry is that, .

when the air is not quite saturated with moisture, evaporation takes place from all free water surfaces exposed to it, and continues until the air has received as much moisture as it can contain. The damp coating of the wet bulb will give off vapour like any other water surface, but in order that the water which is on it should be turned into vapour, it requires heat, which it takes partly from the thermometer itself. This action thus causes the thermometer to fall in proportion to the dryness of the air, and the consequent evaporation. The drier the air the greater is this evaporation, and accordingly the difference in readings between the dry and wet bulb is greater in the same proportion. When the atmosphere is very damp or moist, during or just before rain, when fog is prevalent, or when dew is forming, the two thermometers read very nearly or quite alike, but at other times the wet bulb reads lower than the dry, and the difference sometimes amounts to ten or fifteen degrees in this climate, and to twenty or even more elsewhere. In winter, the difference between the dry and wet bulb readings is far less than in summer, and the same amount of moisture in the air is indicated by a much smaller difference of reading between the two thermometers in the former season than in the latter.

The Board of Trade Barometer Manual.

1. BAROMETER, an instrument by which the weight or pressure of the atmosphere is measured. (Gr. *Baros*, weight, and *metron*, measure.)

2. THERMOMETER, an instrument for measuring the variations of heat. (Gr. *thermē*, heat, and *metron*, a measure.)

3. HYGROMETER, an instrument for measuring the moisture in the atmosphere. (Gr. *hygros*, wet, and *metron*, a measure.)

4. PERMEATE, to penetrate, to pass through the pores of. (Lat. *permeo*, to go through.)

5. ANEROID, a barometer by which the pressure of the air is measured without the use of liquid or mercury. It consists of a cylindrical metal box, the air from which has been exhausted; the

of this box is made of thin corrugated metal, so elastic that it easily yields to alterations in the temperature. The aneroid has the advantage of being portable, and is far more delicate in its indications than the mercurial barometer.

5. CYCLONE, a circular or rotatory storm. (Gr. *kyklos*, a circle.)

THE SLAUGHTER-HOUSES OF PARIS.

THE animals bought at the Paris markets do not make long stay there, but are promptly led to the slaughter-house, which extends over an area of 211,672 metres,¹ and was opened on the 1st of January 1867. The names of certain streets in the old parts of Paris indicate the quarters successively occupied by the butchers. In early times cattle were killed everywhere—a slaughter-house was attached to each butcher's stall.

In spite of the different attempts made to remove beyond the walls the operation of killing, harmful to the population from every point of view, the old spirit of routine had still prevailed, and in the beginning of this century cattle were killed before the very door of the shop where the meat was sold. No less than three imperial decrees (February 9, July 19, 1810, February 1, 1811) were necessary to put an end to this intolerable state of things. These decrees ordered the immediate erection of five slaughter-houses; but they were only finished at the end of 1818. They have partly disappeared now, making room for new roads, and are all to be replaced by the great establishment of the Rue de Valenciennes.

As in the market, the animals are counted as they enter the slaughter-house, care being taken only to let them in at a time by the half-opened gate. Opposite this

gate, beyond a large paved courtyard, are thirty-two buildings, divided into equal groups by three direct and three transversal streets, intersecting each other at right angles. These vast buildings contain stalls for the shelter of the animals, and 123 places where the carcasses are cut up after having been killed in the interior court, situated in the centre of the ranges of sheds. Both the sheds and the yards are carefully paved, and the ground, on an inclined plane, communicates with the sewers. Everywhere water is in abundance. The slaughter-house is frequented daily by some thousand slaughtermen and butchers.

The work begins, according to the season, at four or six in the morning, and is continued until about one o'clock. At two o'clock the retail butchers come and make their purchases of the carcass butchers, who buy the animals at the cattle-market, have them killed and cut up, and sell them on the spot dead and dressed for the shops. One hundred and eighty numbered carts, all exactly of one weight, carry the meat from the slaughter-house to the different quarters of Paris. Before going through the gate they pass by the office of the octroi officers, and stop on a weighing-machine, and thus the exact quantity of meat they take away is recorded. The octroi or town duties payable on the spot are 11 per cent. per kilogramme ?² Of this sum 2 per cent. is reserved specially for the liquidation of the cost of the immense buildings which have relieved the inhabitants of Paris of a pestilent nuisance.

A saw is never used in the slaughter-house ; the only instruments employed are the knife and an axe made wholly of iron, in order to avoid the contingency of the handle coming off. The slaughtermen handle it with marvellous dexterity. With this weapon, apparently so

nwielydy, they sever from one end to the other the vertebral column³ of an ox, with such precision that the spinal marrow is separated into two parts exactly equal.

Among the butchers are five Jews, who, in accordance with their law, never stun an animal, but always kill it by cutting its throat.

In general these butchers, whose trade is to kill, have horror of seeing the animals suffer, and always do their best to despatch them at the first blow.

No part of a dead animal is thrown away; all is turned to account. At the slaughter-house itself, in the first court, is a building divided into two compartments furnished with large boilers, where the sheep's feet and calves' heads are prepared and made ready to be placed as we see them at the butchers' doors in pails of well water. The grease is carefully preserved, and a place has even been built for the purpose of melting it; but it does not seem yet possible to make use of it. The fat of sheep, when of good quality, is used in the making of candles. The feet of oxen furnish an oil used in clock-making. The large intestines of the ox are bought by the pork butchers; the small ones are sent to Spain, to become the cases of sausages highly prized beyond the Pyrenees; the thin intestines of sheep are made into harpstrings, the bones into animal black. All that is absolutely useless for anything else is added to the manure, of which about 16,000 francs⁴ worth are sold annually at the central slaughter-house alone.

In order to encourage the provincial carcass butchers to profit by the rapidity of the railways and to send meat to Paris, in conformity with the decree of police, of the 3d of May and of the 24th of August 1849, a public auction has been opened for meat sent direct by the departments. This auction mart now occupies a

portion of the *Central Hall*, and is divided into two distinct parts, one for wholesale, and the other for retail transactions. Although but recently introduced, this sale by auction has already produced excellent results, and it increases in importance every day.

"Government, and Life of Paris," by M. DU CAMP.

1. METRE, a French measure rather more than an English yard; there are 1608 metres to an English mile.

2. KILOGRAMME, a French weight, about two lbs. English.

3. VERTEBRAL COLUMN, the back-bone, so named because the bones and joints fit into each other.

4. FRANC, a franc is worth about 10d. English money, and 25 francs are about a sovereign.

THE AIR.

THE greatest part of air is nitrogen,¹ there being about four times as much of that as of oxygen.²

Although the proportion is small, yet the *quantity* of this gas in the whole of the air is great, for you must remember that the atmosphere is perhaps forty-five or fifty miles high. It is calculated that in the atmosphere over every acre of land there are seven tons of carbonic acid gas.³

Continual additions are made to the carbonic gas in various ways. Every fire adds to it; for the carbon⁴ in the burning of wood, coal, and other substances unites with the oxygen and forms carbonic acid gas.

Thus fire lessens the oxygen, and at the same time adds to the carbonic acid. If a lighted candle be placed on a plate, and covered with a glass jar, it will burn brightly at first, because there is enough oxygen in the jar; but soon it will burn dimly, and go out. The reason is that the carbon of the candle unites with the

gen to form carbonic gas. If, as the candle is about
out, you lift the jar, the flame will brighten again,
use you let out carbonic acid gas which has fallen
the bottom of the jar, and fresh air comes in to
ly oxygen. If you put two candles, one a long one
the other a short one, under the same jar, the short
will be first extinguished. All fires then lessen the
gen in the air, and add to the carbonic acid gas.

he quantity of carbonic gas breathed out in twenty-
hours is considerable. It is calculated that a full-
rn man breathes out in twenty-four hours more than
pounds of carbonic acid gas, and in this there is
less than half a pound of solid carbon or charcoal.
throws off therefore from his lungs in the course of
ear, nearly 200 pounds of charcoal—considerably
e than his weight.

s all animals, from the elephant down to the smallest
ct, breathe out carbonic gas, the supply of it to the
from this source must be great.

nimals also take oxygen from the air with every
th. It becomes a part of their blood. You could
live, if the blood did not constantly receive oxygen
the air as it passes through the lungs. Death is
ed by drowning because oxygen cannot enter the
d. The water prevents it from doing so. You see
proper it is to speak of oxygen as the lung-food of
body.

low, mark how the air which you breathe out differs
a that which you breathe in. That which you
athe out has less oxygen and more carbonic acid gas.
nitrogen is not altered, for as much comes out as
in.

will tell you a story of an emigrant ship called the

Londonderry. The ship was crowded with emigrants, and many of them were on deck. There came on a storm, and the captain ordered all to go into the cabin. They were here very much crowded, and fresh air came to them only through an opening in the deck. As the waves broke over the vessel, sea-water dashed down through this in great quantities. The captain ordered that tarpaulin (that is, a cloth through which neither water nor air can pass) should be nailed over the opening. The people below suffered dreadfully for want of fresh air. The poisonous carbonic acid gas increased every time each person breathed, and no pure air could get to them. They cried out in their distress, but the noise of the storm prevented their being heard. At length one of the emigrants succeeded in forcing a hole through the tarpaulin. He told the captain that the people were dying for want of air. The tarpaulin was taken up at once. Many were dead, and many were dying. The fresh air saved many, just as letting fresh air into the jar revived the expiring flame of the candle.

The Viceroy of Bengal,⁵ Surajah Dowlah, having taken Calcutta in June 1756, thrust one hundred and forty-six English people into a loathsome dungeon known as the Black Hole, where in one night, as they could get but very little fresh air, the greater part of them died of suffocation.

All animals then in breathing, and all fires in burning, add to the carbonic acid gas, and lessen the oxygen. What, then, is there to hinder the air from becoming more and more loaded with carbonic acid gas, and less and less supplied with oxygen? Here, now, is a wonderful and beautiful provision of our Creator. He has provided means for constantly taking carbonic acid gas

from the air, and of supplying fresh oxygen. Were it not so, all animals would die, and all fires would go out.

And what, think you, are the agents that God has appointed to do this work? They are the leaves: the leaves actually breathe; but their breathing is different from that of lungs. You can see animals that are not small breathe—you can see their chests move; but in the very largest leaves you never see any motion as in breathing. But even a greater difference is in this. While the lungs of animals give out carbonic acid gas, the leaves of plants take it in; and retaining the carbon they give out the oxygen. Every leaf that you see gleaming in the sun, is busy pouring out into the air oxygen from all its little pores, or, as we may call them, breathing mouths, and at the same time keeping carbonic acid gas. . . . What becomes of the carbonic acid gas which the leaves absorb? It furnishes carbon for the growth of the plant. Carbon is a chief ingredient of wood. Now a very large part of this carbon is, under the influence of sunlight, taken in as gas by the pores or little mouths on the leaves. These are spread like nets, and extract the carbon from the carbonic acid gas, and it is carried to all parts of the plant. Whenever you look at a large tree, think how a great part of that solid trunk once moved in the air, and was caught by millions upon millions of little mouths in thousands upon thousands of outspread leaves. Think, too, perhaps some of that hard wood was once in the soft breath coming from your lungs. Even the insect that hums among its leaves may have furnished a little of the carbon which now forms the solid tree. That which you breathe out may go to leaves far and near. Suppose it went to the leaves of one tree alone, how much carbon do you think your lungs would give to the tree in a year? More than the

weight of your whole body, and that would be enough to make quite a large branch.

You see, then, there is everywhere an exchange going on between leaves and lungs: lungs give carbon to leaves, and keep oxygen themselves. But how is this in winter when there are no leaves except upon evergreens? Do these leaves take up all the carbon that is then breathed out? No; they are not numerous enough to do this. Does carbonic acid gas then increase in the air, and oxygen lessen? Not at all. It is as in summer when leaves are alive and breathing. I will tell you how this can be.—You know that gases readily mix with each other, especially when shaken. Now every motion of air, every gust of wind, shakes the gases that compose the air, and scatters the carbonic acid gas. This gas therefore, we may say, flies on the wings of the wind, and breathed out in one place, may thus find its way to many places, not merely miles, but thousands of miles, distant. That which is breathed out at the north in the winter, may thus go to the south to be breathed in by leaves there, and the sunny southern climes send oxygen for the lungs of those who dwell in the north.

The oxygen and carbonic acid gas in the air are continually changing. Oxygen is constantly being used by animals, and by uniting with substances burning. At the same time, fresh oxygen is poured forth from the leaves of all plants into the air; so also the carbonic acid gas is continually changing, being absorbed by leaves, while new carbonic acid gas is supplied from animals, fires, &c.

These changes seem great and very varied, as well as extensive; it is nevertheless true and very remarkable, that in the midst of all such changes and chances, the air in all parts of the earth has always the same exact

proportions of these gases. If a gallon of air from Europe, and another from Asia, and another from Africa were examined by a chemist, he would find that each of them had the same amount of nitrogen, oxygen, and carbonic acid gas that a gallon of English air has. How wonderful this is! In these exchanges which are going on between leaves on the one hand, and lungs, fires, &c., on the other, how is this balance so nicely kept? Men do not know; but the Creator understands it, and He has all power, and secures regularity and suitableness, even in so changing a thing as air.

But you may be thinking what I have just said about air is true only of that which is out of doors, free to go where it listeth." When it is shut up the proportions of its ingredients may be very much changed. Suppose there are many persons crowded into a small closed room; they are using the oxygen and pouring out carbonic acid gas. Suppose a little fresh air gets in at cracks and loose places about the windows and doors; this is not enough to prevent the air in the room from losing oxygen, and becoming loaded with carbonic gas. After while the candles burn dimly, and the people complain of headaches, dulness, and drowsiness. A gallon of air taken from the room at such a time would be very different from a gallon taken from the air outside. It would have just as much nitrogen in it, but much less of the life-giving oxygen, and much more of the poisonous carbonic acid gas.

Great harm is done to the health by breathing air so loaded with carbonic acid gas. It may not be felt at the time; but if such air be often breathed, a little harm done at each time will soon produce very serious results. A few persons were quickly killed on the *Londonderry*

and in the Black Hole at Calcutta ; but many are killed every year by breathing bad air in rooms, and yet they do not know it, because it is done so slowly.

“ *An Easy Introduction to Chemistry*,” edited by
REV. ARTHUR RIGG, M.A.

1. NITROGEN, a gas, which by itself is injurious to human life, but which forms $\frac{1}{4}$ of the air we breathe. It is the chief constituent of nitre or saltpetre, hence the name.

2. OXYGEN, a gas which supports life and combustion, and is therefore often called vital gas ; it is very active and of great power.

3. CARBONIC ACID GAS, a gas formed from the solid carbon and the gas oxygen : it is very heavy and poisonous and destructive to all animal life. The choke, or fire-damp of mines, is carbonic acid gas.

4. CARBON, a solid element, one of the most useful and widely spread on the face of the earth ; it is also called charcoal. Carbon forms the chief constituent of coal, hence the name. (Lat. *carbo*, coal.)

5. BENGAL, one of the three great Presidencies (Bengal, Bombay, and Madras) into which British India is divided ; the capital is Calcutta on the Hooghly, the name given to the chief mouth of the Ganges.

COMBUSTION.

WHAT is usually called *combustion*¹ attends the combining of oxygen with substances such as the solid, carbon, or the gas, hydrogen.² Thus, when we have combustion of charcoal, oxygen combines with the charcoal ; when hydrogen burns, oxygen combines with the hydrogen ; and when iron burns, oxygen unites with the iron.

But we commonly use the term *combustion* only when there are *heat* and *light*, and yet the union of oxygen with other substances often occurs without producing any light. This is when the union takes place slowly. Thus, when iron rusts, oxygen of the air unites with it,

but so slowly that no light is given out ; there is heat, but so little that it cannot be detected by the sense of touch, because the union is so slow. It is, in fact, a *very* slow fire. Now this same combination takes place when iron or steel burns in oxygen ; then we have both *heat* and *light*, because of the union being quickly effected. In both cases it is really combustion. In the one case it is quick, and in the other it is slow. When, then, an iron fence is painted, it is really kept from being burnt, because the paint keeps the oxygen of the air from the iron.

Now you can understand how water puts out fire. It shuts out the oxygen of the air from the burning substance. It does the same that paint does to iron. Perhaps you say that there is plenty of oxygen in water, as it is composed of oxygen and hydrogen, and throwing water on the fire is therefore giving it oxygen. Not at all. Oxygen is not in water *as oxygen* ; it has formed a new substance with hydrogen, and the hydrogen in this new substance holds the oxygen, so that the fire cannot get a particle of it.

But this is not all. There is another way in which water operates in putting out the fire. It takes from the burning substance the heat which is needed to continue the fire. This heat is spent in turning the water into vapour or steam.

When you put out a fire by smothering, you do it in the first of the ways in which I have said that water operates, the oxygen of the air is shut out, and the burning stops merely from want of oxygen. So, if a person's clothes take fire, wrap around at once whatever is at hand—a coat, a rug, or anything—and thus shut out the oxygen of the air. An extinguisher placed over a candle puts out the light by keeping oxygen from it.

Perhaps you may say, people that burn wood cover up their fire to keep it; and why does not shutting out the oxygen of the air, put out the fire in this case? Simply because all the air is not shut out; if it were, the fire would not continue. The continuance of the fire depends on letting a very small supply of air through the ashes, so that there may be a *slow* burning.

As combustion results from the union of oxygen with the burning substance, the more freely the oxygen is brought the brighter will be the fire. When you blow a fire with bellows, you bring the oxygen of the air faster than it would come without blowing; the coals, perhaps, are just glimmering—kept alive, as we say, that is, kept on fire—by the little oxygen that is in the still air about them.

A lighted candle is a fire; oxygen keeps it burning; the more oxygen therefore that is supplied, the brighter should it burn. Why, then, is it that you blow a candle to put it out? A boy once thought that he had given a sufficient explanation in saying that the breath knocks the flame over. The true explanation is this: A certain amount of heat is needed to keep up the burning. Now air may be thrown so rapidly against the candle as to carry off so much heat as to stop the combustion; just as the action of a fan carries off heat from your face. In blowing a freshly lighted fire, we have to be careful, or we may blow away too much heat from the coals.

There are many contrivances for making lights burn brightly; one of these is a glass chimney. See how it operates. The heated air and vapour from the light are confined in the chimney instead of spreading around; they therefore pass very rapidly through the chimney and so cause a draught. This draws air from below, and of course oxygen comes more quickly to the light. Hold

your hand over the chimney, and you will feel a current of heated air and vapour striking it. Be careful not to put your hand too close. This current spreads as soon as it escapes from the chimney, so that, at a distance above the chimney, the hand feels only a small part of the current, and that is cooled.

Another contrivance is to have the wick *flat* instead of round, like a piece of cord. Such a wick presents a larger surface to the air than a round one, and therefore more oxygen can reach it. Some wicks are *circular*, air being admitted to the inside as well as the outside of the circle. A very bright light is obtained in this way.

Observe, now, how we light a fire. We do so by putting something blazing to the combustible substance. Thus, we set fire to wood by blazing paper or shavings, and as we open a gas-burner, we apply a blazing match, and so set fire to the gas. But think a moment *what* causes the match to light. Rubbing, you will say. But how? Friction causes heat enough to combine the oxygen with the phosphorus³ very rapidly, thus making light as well as heat. You see, then, that heat causes what we call fire. Now why is it that some substances take fire more readily than others? Why, for example, does a match with phosphorus on its end take fire by friction, while one dipped in sulphur⁴ will not? It is because phosphorus has what you may call a greater liking, or as chemists call it, affinity, for oxygen than sulphur, and therefore less heat causes them to combine. So charcoal has an affinity for oxygen, but not so great as to cause them to combine by rubbing the charcoal. Phosphorus has a very great affinity for oxygen, and it therefore takes fire so easily that you must be very careful in handling it.

Some substances cannot be burned. Gold is one of

them. Iron, you have seen, can be burned; that is, it can be made to combine with oxygen; but you may expose gold to a very hot fire, and it will only melt. It will not burn. It has only a very slight affinity for oxygen. And what is true of these two metals in regard to quick combustion, is also true of them in regard to that slow combustion I spoke of in the first part of this chapter. Gold *never* rusts in the air; that is, it does not burn as iron does. Hence, outside work which is gilt, that is, covered with *real* gold-leaf (not that leaf called Dutch metal, which looks very like gold-leaf) never rusts or tarnishes in the air.

A statement has been published with reference to the recent fires at Chicago,⁵ giving the results of the various degrees of damage done to ledgers,⁶ business books, &c., which were locked up in iron safes. Some of the papers considered best and strongest suffered most, but all the books with *gilt edges* were, when opened, in a perfect state compared to the others; and the question arises, whether it would not be policy to *gild* the edges of business ledgers, &c., of importance.

"An Easy Introduction to Chemistry."

Edited by the REV. A. RIGG.

1. COMBUSTION, burning. (Lat. *comburo*, burn up.)

2. HYDROGEN, a gas which, combined with oxygen, produces water. (Gr. *hydōr*, water; *gennaō*, generate.)

3. PHOSPHORUS, an element of yellow colour, and wax-like consistency, exceedingly inflammable, and luminous in the dark; it is chiefly obtained from bones. (Gr. *phōs*, light; *phero*, bring.)

4. SULPHUR, a mineral of yellow tint, very fusible and inflammable.

5. CHICAGO, a large town in the state of Illinois, U.S., on the southern shore of Lake Michigan. This town was built very rapidly, and chiefly of wood, and it has been several times nearly destroyed by fire.

6. LEDGERS, principal books of accounts, in which the entries in all other books are laid up, or entered in a condensed form.

STRIKING FIRE.

PERHAPS you have seen fire struck by nails in the heel of the shoe as they hit a stone. You see the spark, and are satisfied with saying of the phenomenon, that "It is striking fire!" as it is expressed.

But what is the spark? It is something more than a mere show of light; it is a burning substance. What is this substance? It is steel or iron from a nail in the heel, which is knocked off as the heel strikes the stone, and the blow causes heat enough to make the very little bit red hot.

The spark, then, is a particle of burning iron. But how does iron burn? There is oxygen in the air, and a blow of the heel upon the stone makes the bit of iron so hot as to cause oxygen of the air to unite with it at once. They unite so quickly as to light up, and so the mite of iron flies off as a bright spark.

The spark falls and goes out. It is so small that you cannot find it. But what is it now? Is it iron? No! for it has been burned. And what is it to burn iron? It is to make oxygen unite with it. The fallen spark, then, is not iron, but iron and oxygen united; that is, oxide of iron.

Suppose that the air were all oxygen, instead of oxygen and nitrogen mixed, striking fire would not end in a little spark; there would be a shower of sparks. Indeed, the fire, fed by oxygen, might burn the shoe, and your clothes, and your flesh, unless water were applied.

Although the particles of iron are thus cooled, because there is not enough oxygen to keep them glowing, yet there are particles of other substances not so readily extinguished. For example, the lucifer matches, by which we now so commonly obtain a light. A much less severe blow or friction than that of which we have been writing, can ignite the ends of these matches, as well as the dry wood of which they are made, and which has been prepared by chemical means for ready ignition.

The invention of matches, by which we can produce a light, has put aside tinder-boxes. About forty or fifty years ago there were no lucifer matches. Persons then obtained light with an apparatus called a tinder-box. This was a tin box with some tinder in it. The tinder consisted of partially burned rags; there was also a piece of flint¹ and a steel. The person who required the light struck the flint upon the steel, and, as you were told at the beginning of this chapter, the minute pieces of steel ignited as they were struck off. These glowing bits fell upon the tinder and caused in it a smouldering creeping fire. Small matches, having the ends tipped with sulphur, were applied to these smouldering embers, and by means of the sulphur ends, the matches ignited, and so a light was obtained.

The method, which the Indians formerly adopted for obtaining fire, was more laborious than that of the tinder-box. They sharpened a piece of hard wood to a point, and very rapidly turned this, after the manner of a drill, against a soft piece of wood, having some light chips around. Practice enabled them to move the stick with sufficient rapidity to set fire to the chips. Any one can make two sticks warm by rubbing them together; but to make them hot enough to set anything on fire is a

different matter. The Indian, therefore, must have thought the tinder-box a wonderful invention.

In these cases fire is produced by the oxygen of the air uniting with the wood of the Indian, with the steel of the tinder apparatus, and with the phosphorus of the lucifer match. It is heat in each case that causes the union. The match takes fire easiest, because little heat is required to make phosphorus unite with oxygen. You can produce enough heat for this by slight rubbing. It is supposed by some, that many of our fires are occasioned by phosphorus or lucifer matches carelessly left about. A cat or a mouse might knock them off a shelf ; and if they should happen to fall upon something combustible, as paper, or clothing, a fire might result.

What you see on the end of a match is not phosphorus alone, but a mixture of this with some other substances, which make it burn more readily than if it were alone. The reason being that they have oxygen in them ; and the more oxygen there is to unite with the phosphorus, the more readily will it burn. In lighting the match, friction makes the phosphorus unite with the oxygen in the mixture, in addition to that in the air.

Machinery is sometimes set on fire from heat occasioned by friction ; that is, the iron becomes so hot that it heats the wood sufficiently to make the oxygen of the air unite with it. If the axles of railway carriages are not kept well greased, heat produced by the friction sets the little grease that is in the axle-boxes on fire ; that is, makes the oxygen of the air unite with it.

The knife-grinder with his rapidly revolving wheel, or disk of stone, makes the sparks fly off, really burning part of the knife that he is grinding.

" Easy Introduction to Chemistry."

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1. FLINT, a very hard kind of stone, formed chiefly of an element called *silica*. Flints are found chiefly as pebbles, more or less rounded, among the chalk of the South Downs, &c. Flints were formerly used as arrow-heads, and the word comes from the A.S., and means literally *arrow-stone*.

ANIMAL HEAT.

WHAT makes your body warm? You will perhaps say clothes and fires. No; they help to *keep* you warm, but they do not *make* you so. The heat that makes you warm is produced in your own body, and is made by real combustion. There is, as it were, a fire in your body. It is a real fire, though there is neither flame nor light.

This is one reason why you cannot live without oxygen. This gas is needed to keep up the fire in your body, just as it is needed to keep all fires burning.

In the *results* of the combustion, the burning in your body is like the burning of a common candle. The oxygen of the air unites with the carbon of a candle to form carbonic acid, and with the hydrogen of a candle to form water. So, also, the oxygen that enters your lungs unites with the carbon of your body to form carbonic acid, and with the hydrogen to form water. But *where* in the body does the oxygen find the carbon and the hydrogen? It finds them everywhere. They make, in part, your body as they do the candle. Blood circulates everywhere, to the very ends of your fingers, and so carries the oxygen taken from the air to the lungs. The warmth in your fingers, and in every part of your body, is made by the combination of oxygen with hydrogen and carbon.

But you will ask, "Are carbonic acid gas and water formed in the very ends of my fingers as they are in the

burning candle?" Exactly so. "What becomes of them?" you will say. "Do they go from my fingers into the air as they do from the candle?" Perhaps some of the water does. "But the carbonic acid gas, what becomes of that?" It goes in the blood to your lungs, and there is breathed out into the air.

Part of the food we eat acts as fuel; that is, it supplies the carbon and hydrogen that are continually burned in our bodies. There are some foods that furnish much carbon and hydrogen, and so keep up the fire in us. Sugar is one of these, fat is another. Inhabitants of very cold climates, as the Esquimaux,¹ eat large quantities of fat and oil, because they are of use in keeping them warm. They need food that has charcoal in it for fuel, to guard them against the extreme cold of the climate. They love food of this kind. A captain of a vessel invited one of these people to dine with him. His guest declined the coffee and wine which were offered, but, seeing an oil-can near, he took it and drank all the oil. That he liked for he had been accustomed to drink it to keep himself warm. But coffee and wine he did not think of much use.

Sugar is one kind of food that furnishes fuel for the fire in us. You can hardly believe what a large portion of sugar is charcoal, but so it is. Indeed, sugar and wood are composed of the same things; and as charcoal can be got from wood, so also it can be got from sugar.

You have learnt that the carbonic acid gas, which a man breathes from his lungs in a year, contains about 200 pounds of charcoal. Now this carbonic gas comes from the fire in his body, and in this fire 200 pounds of charcoal unite in his body with oxygen. Where does all the charcoal come from? It is swallowed in the food—in the sugar and fat, &c., that are eaten. You thus

swallow every year an amount of charcoal, which weighs more than you do, and in burning it keeps you warm.

In running and playing you become heated. Think why this is so. The heart beats quicker than when you are still, and therefore blood flows very rapidly in the arteries and veins. At the same time you breathe quickly. Now the quick breathing introduces more air, and therefore more oxygen, into the lungs; more oxygen of course enters the blood, and as the circulation is quickened the oxygen is carried everywhere more quickly. The internal fire must therefore burn more briskly in every part of the body, for the same reason that fire in a fireplace burns more quickly by blowing. Oxygen in both cases, in the fire in the body as well as in that in the fireplace, comes faster to the carbon and hydrogen.

Did you ever think that your body is always giving out heat to the air? Even in very hot weather the air is almost always cooler than the body. You are uncomfortably warm on a hot day, because your body does not give off enough heat.

A large number of persons, therefore, when crowded together give out much heat. We see this illustrated in large parties. When only a few persons are present, the rooms are comfortable; but when many are assembled, the air becomes uncomfortably warm. If a hundred persons are present, we may think of them as a hundred fires warming the air.

Again, if you stand still without sufficient clothing you become chilled. Observe how this is; the air is passing into your lungs carrying in oxygen, which keeps the fire in you burning, but the fire is not sufficient to keep you warm, because the air is so cold, that it receives much heat from the outside of your body.

How may this be remedied? In two ways. ,

One is to make the fire in your body burn more briskly ; this can be done by exercise, such as running, jumping, working, &c. Then the blood circulates quicker, and you breathe faster ; so more oxygen enters, and brightens up the fire, in the same way as the fire in a grate is brightened by air entering in from a pair of bellows. You have seen persons in cold weather strike their arms across the body and rub their hands together. This is to make the blood flow more freely to the very tips of the fingers, that an abundance of oxygen may be there to unite with the carbon and hydrogen, and so produce sufficient warmth.

Another remedy is to put on more clothing. Thus the heat which the fire in you is constantly making is retained. This is the reason why more clothing is needed, when you are driving in a carriage than when you are walking or playing.

For animals that live in cold countries the Creator provides clothing fitted to retain the heat which is made in their bodies ; they are clothed with furs. Contrast the polar bear and the elephant in this respect. The bear has a good furry coat, while the elephant, that lives in a warm climate, has only a few straggling hairs upon his skin.

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1. **ESQUIMAUX**, a people inhabiting Labrador and the northern shores of America and Asia, where the cold is so intense that vegetable life can scarcely exist. The Esquimaux live chiefly on the flesh and fat of seals, whales, &c. They inhabit huts made of snow, lined with skins, and quite air-tight, so that the heat caused by the combustion of oxygen in their bodies may not escape.

WOOD.

WOOD is composed of carbon, oxygen, and hydrogen, of a solid united with two gases. When we make charcoal we decompose the wood. We send the oxygen and hydrogen into the air by heat, and the carbon is left.

Though wood can be thus decomposed,¹ you cannot take the ingredients and unite them so as to make wood. If powdered charcoal be mixed with water, there are the ingredients of wood together ; but you cannot make them unite to form wood.

Although *we* cannot make the ingredients of wood unite to form wood, it is done in the tree. Let us see how. Much of the carbon is furnished from the air, being taken in by the leaves, as you learned on page 291. Then the water coming in the sap from the roots furnished oxygen and hydrogen ; for water, you know, is composed of these two gases. We may say, then, that the tree makes its own wood out of charcoal and water.

The bark of trees is wood, only in a different form from that which it covers. Hold a leaf so that light can shine through it. That delicate framework you see is a wooden framework. More than this, the skin of the leaf and its filling up are wood. The whole is wood except the sap, and that which gives it its beautiful colour ; and what I have said of leaves is true also of flowers. The most delicate flower you can find is made of wood—very, very fine and delicate is such wood, and yet it is wood.

You see a hyacinth growing in a glass vessel, in which is nothing but water. The plant is little else than wood filled in all its cells with water. See how this wood is

formed, water furnishes the oxygen and hydrogen, and the carbon comes from the air.

Every stalk of grain and grass is chiefly wood. In both cases fine particles of flint are scattered in the wood to make it firm enough to stand even a gale of wind.

Much of the clothing you wear is nothing but wood. You can hardly believe this, but so it is. A shirt, whether of cotton or linen, is a wooden shirt. Cotton or linen fibre is woody fibre. It is composed of carbon, oxygen, and hydrogen in exactly the same proportions with what we call wood.

You remember that you learned on page 300 about the old-fashioned tinder-box ; charred or scorched linen was always kept in the box to catch the spark from the steel. That was really charcoal, made from linen, just as we make charcoal from wood ; that is by a partial burning. It was used instead of common charcoal, because being so fine sparks readily set fire to it.

All paper is wood. When fine, as writing paper, it is made of cotton and linen rags, and these are wood. If you tear a piece of letter-paper, and look at the torn edge through a microscope, you will see very plainly the woody fibres pointing in all directions from the edge.

All the framework, as we may call it, of fruits, is wood. All the partitions in fruits are wooden partitions. The orange, you know, is divided into several parts by partitions. These are of wood. The juice of an orange is inclosed in thousands of little bottles, and these are wooden bottles. Observe and see how pretty they are, and how nicely they are packed in each part of the orange. Their large, rounded ends are towards the peel, and their slender, pointed ends are

towards the middle of the orange. When you eat an orange you crush a multitude of these wooden bottles, and the juice runs out of them, so, when you eat any juicy fruit, you break up wooden apartments or cells that hold the fluid. Even in the most juicy fruits there is wood, and the skins or coverings of fruits are made of wood.

The coverings of seeds are wooden. In nuts the woody substance forming the covering is very dense and hard, as in a cocoanut, walnut, &c.

"Easy Introduction to Chemistry."

Edited by the REV. A. RIGG.

1. DECOMPOSE, to resolve any substance into its original elements or component parts.

VEGETATION.

EVERY plant comes from a seed ; and when this is put into the ground, a root shoots downward into the earth, and a stalk shoots upward into the air.

As the stalk and root are built, channels or tubes are formed along them. Through these tubes sap goes to every part of the plant. This is true of every plant, from the smallest to the largest. Look at a very large and high tree, the life in a little seed began that. It pushed up the stalk a little higher and higher, making tubes in it all the while ; and now that it reaches so high, sap goes along those tubes from the very ends of the roots to the very ends of the leaves.

Let us see of what the seed, from which all this comes, is composed. It is chiefly starch¹ and gluten.² Now these substances are insoluble.³ Of what use, then, can they be in growth, when they cannot circulate in the

tubes. Unless they be rendered soluble, they must remain in the seed.

But the required change is produced in them. As a seed becomes moist, oxygen is absorbed, and thus gluten is made soluble, and the starch is changed into sugar, which you know is soluble. So as fast as channels are made in the upshooting plant, sap, with dissolved gluten and sugar, circulates in them. When the little root is formed, and the stalk reaches the air and puts out leaves, the seed may be said to have passed away, its gluten and starch are exhausted. The plant now gathers all its materials for growth from the soil and the air. These are carbon, oxygen, hydrogen, and some nitrogen. As you have learned, it obtains from the air carbon, taking it in at every pore in the leaves. Oxygen and hydrogen are obtained from the water that waters the roots.

From whence comes the nitrogen? All the nitrogen, which a plant gets, comes through the roots. There are various substances in the soil that supply it. One is ammonia, which is composed of nitrogen and hydrogen. This substance abounds in most manures, especially in guano.⁴

You see that carbon, oxygen, hydrogen, and nitrogen are the four grand ingredients in vegetables and plants, also that the first three of these compose the framework, the structure. There is no nitrogen in woody fibre, it is found only in some fruits and juices. It is put there as a part of the food of animals. Plants gather nitrogen from the earth, and deposit it within their fruits and juices for the use of man and other animals. It is deposited just where it is wanted. For example, none is lodged in the stalk of wheat, but it is in the seed or grain, so that we have it in the flour with which we make bread.

Besides these things, silica or flint is in the stalks of grain and spires of grass. In many vegetables, as mustard and onion, there is sulphur. Then there are phosphorus, lime, potash, iron, &c. All these are carried in the sap through the channels of which I told you in the first part of this chapter.

Now think what sap is. It is chiefly water, having dissolved in it the various substances already mentioned. Water, then, not only furnishes the plant with oxygen and hydrogen, but is the means by which other substances, needed by the plant, are carried in its channels or tubes to the very ends of the leaves. Some of the water remains in the plant, giving its oxygen and hydrogen to it, to help to form wood, starch, gluten, sugar, &c. But the largest part of it is breathed into the air through the little pores of the leaves.

The quantity of water that passes from the roots through the channels in plants is much greater than most people suppose. We can get some idea of this by ascertaining how much passes from the leaves. Some experiments have been tried in regard to this, and it was found that a single cabbage breathed from its leaves into the air, in the course of twenty-four hours, nearly a quart of water. If so much comes from a cabbage, how much must all the leaves of a huge tree throw out into the air!

In all juicy fruits there is much water. In the water-melon there is so much that it gives its name to the fruit. It is almost all water, with a little sugar dissolved in it. The cells containing this juice are really wood, but very delicate, even more so than those of the orange.

It is the water in leaves and flowers that gives them softness. You know how stiff the leaves of flowers are

when pressed and dried by the botanist in his herbarium;⁵ it is because the water is gone from their cells.

You must have noticed how readily the stalks of grass and grain bend before the wind and then rise, giving the wavy motion so beautiful in a field of grain. This is because there is much water in the cells and channels of the stalks ; when, however, the stalks of grain are dry, as you see in straw, they cannot be so bent.

Freshly cut wood is said to be green, that is, full of sap ; hence there is much water in the wood. This prevents it burning well ; but if left in the air, the water passes off, and therefore the wood becomes dry.

When wood is burned there are ashes. These are of small bulk compared with the wood. There is only a pound or two of ashes from a hundred pounds of wood. What has become of the remaining ninety-eight pounds of wood ? It has passed into the air. The water passes off in vapour, and most of the carbon of the wood, uniting with oxygen, flies off as carbonic acid gas. If this were all, the smoke would not be visible, for you cannot see either vapour or carbonic acid gas ; but there are little particles of carbon, and these form the smoke you see.

What is really the composition of ashes ? These are composed of potash, silica, lime, iron-rust, &c. These substances are found in different proportions in the ashes of different plants. Thus there is more silica in the ashes of straw than in those of common wood. There is much potash in the ashes of wood, hence the use of them in making soap.

Let us examine more closely what plants get from the ground to make them grow, and how they do it. Every year dead plants and leaves become a part of the earth, and help to form the plants of another year. Barren

sand may be made good rich earth by mingling with it decayed or decaying vegetable substances. If in a garden there is a pit, into which weeds and small trimmings from trees are thrown, you can dig from it in two years' time the richest kind of earth, the produce of decayed vegetable matter, which can be used to assist in the formation of other vegetables.

Thus decay and death furnish materials for new life. The living beauty that gladdens our eyes in spring comes, to a great extent, from what fell to the ground and died in previous years; and not only so, but that which at one time is putrefying, becomes a plant which, with its leaves and flowers, delights the eyes, and supplies fruits which are pleasant to the taste. Nitrogen, one of the ingredients of the ammonia so strong in manure, goes up the channels of the wheat-stalks, helping to make the gluten of the grain, and as you eat this in bread it forms a part of the substance of your body.

"Easy Introduction to Chemistry."

Edited by the REV. A. RIGG.

1. STARCH, that which is stiff or strong. A gum-like substance of much strength and tenacity; a preparation of this is used for stiffening linen and cloth.

2. GLUTEN, a sticky substance which forms one of the most important parts of all grains, which are more or less nourishing as they contain more or less gluten.

3. INSOLUBLE, that which cannot be dissolved or melted. (*Lat. solvo, loosen.*)

4. GUANO, a manure obtained from the dung of certain sea-fowl found chiefly on the coasts and islands of South America. The word is Spanish.

5. HERBARIUM, a classified collection of preserved herbs or plants. (*Lat. herba.*)

CHEMISTRY OF ANIMALS.

BLOOD is to an animal what sap is to a vegetable. Sap is water, having dissolved in it whatever is necessary to

the growth or building up of the plant; and blood is water, having dissolved in it whatever is necessary to the growth or building up of the animal.

About four-fifths of the blood in man is water; that is, in every five pounds of blood, there are four of water. Perhaps you are asking what substances are dissolved in this; that is, what make up the other fifth of the blood. They are carbon, oxygen, hydrogen, nitrogen, chlorine,¹ sodium,² potassium,³ magnesium,⁴ iron, phosphorus, and sulphur.

Now how do all the substances get into the blood? Chiefly from the food we eat. That part of the food which will nourish the body is drunk in by little pores in the stomach, put into the blood and made a part of it. It is as little mouths in the roots of a plant drink in from the earth what is proper to go into the sap. Thus the root of a plant and the stomach of an animal perform similar duties.

There is one substance, oxygen, all of which does not get into the blood from the food; part of it enters by the lungs as we breathe.

All the parts of the body are made out of blood. For this purpose the blood, containing the different substances mentioned, circulates everywhere in the body; and materials required for building are used just when wanted. For example, when it is necessary to make bone, materials for bone are taken from the blood, and arranged so as to make bones of the right shape.

So where nerve is to be made, those materials are taken from the blood of which nerve is composed; and the same is true of all other parts of the body.

There is iron in blood. It is in a substance that gives the red colour to this fluid. Very little of it is found in the solid parts of the body. None is in the nerves,

though persons who have much firmness of character are said to have iron nerves. There is a very little in the hair, helping, with silica or flint, to give it strength. When persons are pale and weak they have not enough of it in the blood, and therefore we give medicines that have iron in them.

You see what a variety of substance there is in blood. Now, when different sorts of food are eaten, it is easy to see how all these substances are furnished to the blood. But how is it with a child that lives on milk? Can there be mingled in that white fluid all the substances I have mentioned? If they were not, there would be something missing in the building up of the body. If, for example, there were no phosphate of lime in milk, the bones of an infant living on milk would be soft, and bend very easily, for it is the phosphate of lime that makes them hard and stiff. Milk contains all substances required for the growth of the body. It contains all the nutritious substances which can be gathered from meats and vegetables. Milk is made from blood, and blood is again made from milk, and they are only two different forms of the same ingredients. The milk of a cow is made from her blood by a chemistry which we do not understand, and when we take it into our stomachs, the chemistry there reconverts it into blood. How the iron is in the milk, and is prevented from colouring it red, as it does the blood, we do not know.

No matter how many different articles we eat, the nutritious part of them all, when taken and put into the blood, is a whitish fluid very much like milk; it is called *Chyle*. This fluid is separated or extracted from meat, potatoes, rice, turnips, cabbages, &c., and it contains all that is needed to form bones, teeth, brain, skin, nerves, muscles, hair, nails, &c.; with one single exception—I

nean the oxygen which it gets from air in the lungs. Chyle goes to the lungs to receive a supply of oxygen ; and then it becomes a part of the blood.

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Edited by the REV. A. RIGG.

1. CHLORINE, a yellowish-green gas ; a powerful bleaching and disinfecting agent. (Gr. *chloros*, pale-green.)

2. SODIUM, a yellowish-white metal, the base of soda, which is the oxide of this metal. (Lat. *sal*, salt.)

3. POTASSIUM, an alkaline metal, of a bluish-white colour and strong metallic lustre : the oxide of this metal is potash.

4. MAGNESIUM, the metallic base of the earth, magnesia.

SHELLS, CORALS, AND BONES.

THE shells on the sea-shore are made of carbonate of lime.¹ All oyster-shells are made of this substance. The lime used for making mortar and other purposes is often obtained from oyster-shells just as we obtain it from limestone. The shells are intensely heated, and the heat drives off the carbonic acid gas and leaves the lime alone.

Whence comes all this carbonate of lime of which the shells are made ? it is dissolved in the water, as salt is. But how does it get into the water ? From the earth and rocks of limestone. It is washed along in brooks and rivers, and at length reaches the sea.

But how, think you, is this carbonate of lime made into shells ? Does it gather from the water on the outside of the animals that live in the shells ? Does the oyster, for example, lie still and let the shell form by carbonate of lime settling little by little from the water, as it crusts upon stones or sticks in a spring ? No, this is not the way. All that large rough shell has been swallowed by the oyster, and been in his blood. Only

a little at a time was swallowed, dissolved in the water; but that little was used in building his house.

Look at an oyster-shell carefully. There are different layers. The outside layer is smaller than the one next to it, and this is smaller than the next, and so on. The one next the oyster is the largest. The outside layer was made when the oyster was very small—the first layer as we may say. Then as he grew, another layer was formed as carbonate of lime oozed from his skin.

All shells are not made *exactly* after the plan of the oyster-shell; but it is true of all, that every particle has been swallowed in the water drunk by the animal that lived in the shells.

There is one class of animals which make a special use of the carbonate of lime they swallow. I mean the coral animals. These tiny builders have been the cause of making reefs and even islands in the Pacific and other oceans, all of which are formed entirely of carbonate of lime.

Egg-shells are also made of carbonate of lime. Hens sometimes lay eggs with no shells on them. Why is this? It is because they have not swallowed enough carbonate of lime. They take it mingled with food, the dust scattered about from broken oyster-shells, chalk, &c. As the canary pecks at the fish-bone in her cage, some of that dust becomes mingled with her food, and being swallowed, is used in making the egg-shells for the eggs she lays.

Bones of animals are made chiefly of a salt of lime, but not the carbonate, it is the phosphate, a compound of phosphoric acid and lime. The three ingredients of this salt are phosphorus, oxygen, and calcium; ²

phorus is made from bones ; that is, it is obtained from bones by separating it from the oxygen and the calcium, that are united with it. There is much phosphorus in bones.

The phosphate of lime that is in our bones is swallowed in food, and, entering the blood, goes to the bones. Some of this salt is in both animal and vegetable food. It exists in the milk upon which infants live.

You see, then, that it is with the phosphate of lime in our bones, as it is with the carbonate of lime in the shells of oysters and other shell-fish, in the bony skeletons of coral animals, and in the egg-shells of birds, the building materials is swallowed, and, entering into the blood, is carried where it is wanted for building.

Think now whence came all the carbonate and phosphate of lime that are in the bones and shells of animals. They came from the rocks. Yes ; the phosphate of lime in your bones was once on the rocks. But how did it get from the rocks into your bones ? Rocks are constantly crumbling from the influence of frost, and water, and wind. What crumbles, mixes with earth, gets into plants in the sap, which the roots suck up. If you eat vegetables, or the meat of an animal that has eaten vegetables, you introduce into your stomach, and so into the blood, some of the phosphate of lime from the rocks.

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1. CARBONATE OF LIME, a salt, composed of carbonic acid gas and oxide of lime.

2. CALCIUM, a yellowish white metal, present in compounds of lime. (Lat. *calx*, lime.)

FOOD AND ITS USES.

NATURE has provided in the appetite and the faculty of taste the power of selecting food, whereby the appropriateness of the food to the wants of the body, if it be attainable, is in great part assured. Simultaneously with the satisfaction of the appetite, changes are effected in the food as it is mixed with saliva in the mouth during the act of mastication, or with the juices in the stomach, by which it is rendered of a proper consistence, and its elements are re-arranged to suit the requirements of the body. At this stage the food is prepared for admission into the blood, and then a further selection is made both in quantity and quality, according to the necessity for nutriment which the body experiences, by which a check is offered to any excess of the appetite; and whatever portions may remain, together with such parts of the food as were not digested, are passed from the body.

The food thus prepared having entered the blood is then applied to the satisfaction of four classes of wants; first, to the supply of the daily waste, and the maintenance of the fabric, then to the growth of the body, if that process be still going on, and finally, to the storage of food-material if any portion remain unused. Hence, with an abundance of food, and with the necessity existing, all these processes are inseparably combined; yet, speaking generally, they proceed in the order in which they stand in their importance to life, it being of the first consequence to live, then to grow, and last of all, to provide for the future wants of the body.

For the maintenance of the fabric¹ of the body it is needful that the supply of food in the blood be both in

kind and quantity quite equal to the amount of waste which is proceeding, so that the gain and loss being equal, the composition of the body shall remain the same at all periods. The body is essentially made up of two classes of substances, which must differ much in the rapidity with which they are changed, viz., the framework of each structure or tissue, and the fluid or semi-fluid substance which the tissues enclose, and which is more directly in communication with the circulating blood. There can be no doubt that the particles of the tissues themselves change, but more slowly with advancing age; for it is of everyday observation in reference to the lower animals, that the meat of an old animal is much tougher than that of a young one, and this we must assume to be due to less frequent change in the former than in the latter. The contents of the tissues, part of which constitute the juices, from their semi-fluidity and connection with the circulation, will change their particles much more frequently, and it is to them that I especially refer when I speak of the maintenance of the fabric of the body. Whatever portion of them is lost must be restored, or the fabric must fall.

The daily requirements of the body include the maintenance of its heat and of its tissues,² under the varying conditions of labour and exposure. These requirements are in a degree quite distinct, and yet there is in fact the closest connection between them. The body demands a certain degree of heat, in order that its vital actions may be properly conducted, but at the same time, it is almost always placed in an atmosphere of a temperature lower than its own, and thus loses its heat more or less rapidly; and one of the great problems of life is to supply this loss. It is a wise arrangement, that every vital action occurring in the body is attended with the pro-

duction of heat, and as these vital actions proceed without intermission, they afford a certainly recurring supply. They are associated with the change which the food undergoes in its own transformation within the body, and with the juices and tissues as they are wasted and ultimately leave the body. The former are the most abundant sources of heat; and as there are certain foods which cannot form the tissues of the body, but which in their changes supply heat largely, they have been called "heat-generating" foods. They consist largely of carbon, and are hence called carbonaceous, and their changes chiefly engage the functions³ of respiration.⁴

The other daily requirement is the supply of the waste of the juices and tissues of the body, which proceeds without intermission by night and day. This waste includes all the substances of which the body is composed, and as nearly all the soft structures contain nitrogen, the waste is known as that of nitrogenous matters; and in proportion to the waste must be the supply of food of precisely the same nature, and therefore largely abounding in nitrogen, or "flesh-formers."

Both of these classes of operations vary with every known condition of life, and particularly with exertion; and hence the supply of food, both in quantity and kind, must vary also.

The process of growth has its defined limits both in extent and time, so that whilst the amount of it often falls short, it rarely exceeds that which is common to the race; and whilst in respect of certain portions of the body, the period of full development approaches middle life, nearly the whole of the process is effected in infancy and youth. The importance of the latter fact can only be duly estimated when it is further stated, that as each step of growth has its appointed period, if it be not then

taken it is for ever lost ; and as the whole period of growth is in like manner limited, any deficiency in the whole can never afterwards be supplied. Hence infancy and youth are the most important periods in reference to the due nourishment of the body, since, whilst they embrace all the questions which affect adult life, they have in addition their own special responsibilities, which can never be delegated * to other periods. The growth of the whole body implies the growth of its several parts, and the food must furnish the material out of which each part is to be formed.

The process of storing material, with any approach to sufficiency of food, takes place in every individual to a very limited degree, but only in certain persons to a marked extent. The former occurs in the blood and juices ; for the food, which is taken at a meal, requires a longer period for its final transformations and ultimate uses, than is allowed between the meals ; and therefore it accumulates through the day, and the body is heavier at night than in the morning. This is, however, most limited in extent, for, except in extreme cases, no part of any excess of food, which has been taken in one day, is found in the body on the next day. The wants of the body must be supplied as they occur (at least with the moderate extension of the time of the intervals between the recurring desires for new supplies of food), and the wants of each day must be supplied from the food of that day. But in reference to the storing up of nourishment for future use, the faculty for it varies much more with the individual than with the amount of food, which is taken. The store of food, which is thus laid up, is almost entirely fat, and it may be produced directly from fat, which was taken as food, or from starch and sugar in the foods. The fat is found separate in certain

fact, that the body can thus meet a part of its the absence of the daily supply of food, who fail from the absence of food, or from the absence of appetite to take it ; and it may not be doubted that a moderate store of fat prevents disease, and, when it occurs, enables the body to be sustained through the other hand, as the body is essentially prone to exertion, any mere storage of food within the body impedes its action, and in place of aiding the demand the exercise of power for its own maintenance. Hence it may be a burden to the acting power of the body. The mind suffers as well as the body, and any large storage of material is a burden to the mind, and an almost insuperable impediment to the full exercise of the mind. The foods, which can thus be stored, are carbonaceous, and must be either fat, or sugar to be converted into fat.

"Practical Dietary," by DR EDWARD

1. **FABRIC**, structure, anything framed by art and labour, *faber*, a workman.)

2. **TISSUE**, the substance of which organs are composed. (*Lat. tess, to weave*.)

HINTS ABOUT MEALS.

WHEN the husband or any member of the family leaves home for work before the breakfast hour, he should eat a piece of bread with half a pint of milk, or bread and butter, or bread and cheese. Hot food is then desirable, but it is not convenient, when fuel is scarce.

The best breakfast, for every member of the family, is milk boiled with oatmeal and eaten with bread, or Indian meal hasty pudding, or oatmeal hasty pudding eaten with milk. If skim milk can be bought at one farthing or even one penny per pint, and three pints be used for the breakfast of the family, it will be the most economical and nutritious meal, which can be procured. It would be needful to add to the milk a little water and a little fat of some kind (as butter or suet), and it should be moderately thickened with oatmeal or flour.

The husband should, if possible, take with him, or obtain, one pint of milk, which he should make hot in his can over a kitchen fire, or a few burning sticks, and eat it with plenty of bread. Very few employers would refuse to sell him milk for his own use on their land. Next to this food is bread and bacon, with butter-milk or hot coffee, or tea, if a little milk can be added to it. The husband often eats his share of the bacon cold in the field, and the wife and children fry a little for their separate use at home. Next to this is bread and cheese, or bread and butter, or dripping, then bread and treacle, and lastly, dry bread with butter-milk or whey. With each of the latter it is well to prepare a sop or broth, such as is in use in many parts of the kingdom, bearing the name of tea-kettle broth, and consisting of meat liquor, if possible, or of water with a little fat added,

and bread, a little flour, and seasoning. If people could be taught to like broth, and induced to make it with meat or bacon liquor and vegetables, it would be an advantageous substitute for tea and coffee, when bacon and milk are not obtainable—that is to say, when bread must constitute nearly the whole breakfast.

When the husband is engaged in out-of-door and heavy labour, he should take a little bread and cheese at ten o'clock.

It is most desirable, that all the members of the family should take their dinner together, since the domestic comfort is increased, the father sees something of his children, the whole meal is better cooked and made more comfortable, and the food is more suitably divided amongst the members of the family. Hence the husband should, if possible, return home to dinner, if he work within one mile of his home. If, however, he must dine away, he should be induced to cook, or at least to warm, his food at the farmhouse fire, or to make a little fire for that purpose, rather than have another cold meal; and if the food be only bread and cheese, he should warm the beer or cider, which he would drink with it. A supply of broth, either sent from his home or given by his employer, as on the Yorkshire farms, or taken by him from home, and warmed in the field, would be a most advantageous addition to his meal, and might readily be warmed in the can in which he would carry it. A little dry turf or a few sticks would be quite sufficient for the purpose.

The dinner should always consist of some kind of animal food, with hot vegetables and bread, and if possible, a pudding should be added; but if broth were provided, it might take the place of pudding. Small portions of bacon, liver, or heart, or bits of butchers' meat or herrings, should be fried with or without vege-

tables, and the quantity should not be less than two ounces for each adult, with a less portion, and the vegetables and gravy, for the children (but for the husband it should amount to a quarter of a pound); or the liquor from the boiled cow's or sheep's head should be made into properly-seasoned soup, with dry vegetables and fresh vegetables on alternate days, eaten hot with a portion of the meat so long as it lasts, and failing that, to be followed by a pudding or bread and cheese, and bread and fat for the children.

Whilst a good dinner on the Sunday is to be desired, it is yet more important that no indulgence on the Saturday night and the Sunday should be allowed, which will cause the consumption of more food than can be provided for the other days of the week. It should be the aim to distribute the food so, that there shall be a comfortable dinner every day.

When the stock of potatoes has been exhausted, and the supply of green vegetable is insufficient, the labourer should seek to purchase turnips or turnip-tops from his employer, and to use peas once or twice a week, and boil rice once a week, and thus supply both vegetables and nutriment.

The best puddings are made of milk with flour, bread, Indian corn, rice, or Scotch barley, a little butter or suet, spice and sugar being added. When boiled flour-pudding is made, some fat or milk should always be added to it. With a good milk pudding and bread, the children would make a sufficient dinner occasionally; and if possible, they should have a milk pudding daily. Suet puddings, treacle roley-poley puddings, and fruit or rhubarb puddings and pies in their season are very good; but fruit pies alone should not constitute a dinner unless accompanied by plenty of milk.

When the husband is unable to return home to dinner,

it is still very important, that the wife and children should have a comfortable meal ; but the absence of fuel will often prevent it.

The tea meal is usually taken by the wife and children alone, when the husband works from home, and as it is the last meal which the young children usually have, it also should consist of milk and bread, or bread with butter, dripping, or treacle.

The supper, when all have eaten a hot dinner, should consist of milk porridge, or oatmeal or Indian meal pudding ; and in the absence of this, of bread and bacon, or bread and cheese, or bread and butter, with butter-milk if possible.

When the husband has not returned home to dinner, and neither he nor the family have had a hot meal, and a hot supper is provided for them, it should have the characteristics of a dinner. It is much enjoyed as being often the only hot meal in the day, and the only meal at which all the members of the family meet. Hence it is difficult to find fault with it ; but there can be no doubt that it is better for the husband, if away from home at dinner, to make his meal hot, and for the family to dine in the middle of the day, so that the evening meal may consist of milk.

" Practical Dietary," by DR EDWARD SMITH.

HOW TO CHOOSE GOOD AND CHEAP FOOD.

WHEN the pressure of poverty is extreme, the poor man's family should be fed almost entirely upon bread, since, at its usual price, bread is the cheapest food of *any* in ordinary use, in relation to the nourishment it

affords. The first duty is to provide sufficient food to maintain health ; after that it will be right to please the palate.

The cheapest fat to eat with bread is dripping, if it can be obtained, and next to that, bacon ; the fat of mutton, which is cut off the meat is often sold at a low price, and when boiled and eaten cold, is a cheap fat. Butter is the dearest fat, but there are very low-priced admixtures of fats sold under that name, which, if the flavour be not objected to, would occupy the next place in point of economy. Butter has, however, the advantage over other fats of being always attainable, always ready for use, of having an agreeable flavour, and of being of a proper consistence¹ to spread upon bread, and will therefore be more generally used than the other fats.

Peas when split, or with the shells strained out of the liquor, are a very valuable food, and their use should be largely extended. The best modes of using them are in making soup, or a pease-pudding, and hence they may be used whenever bacon has been boiled, or when there is fat with which to boil them. The peas for pudding should be boiled with the bacon, or with some fat liquor, and when eaten should have a fat flavour. In soup it is important, that the flavour be changed by the addition of herbs of different kinds, so that the children may not be disgusted with it, and peas should not be added to broth at all times. Moreover as the flavour is harsh and the food a very strong one, it is not well that large quantities should be eaten at a time. The pea-soup should not be made too thick, and the pease-pudding should not be eaten too freely. They may be used with advantage once, or perhaps twice, a week, if properly cooked, and are better used as a part, than as a whole, meal.

Potatoes and green vegetables are of the utmost economy to the poor who live in the country, since they are produced at very little cost. They also supply much nutriment, are agreeable foods, and may constitute a large part of a dinner, or supper, with the addition of a little fat, when meat or bacon cannot be obtained. Potatoes are by far the best of this class of foods, and it should be the care of the labourer to provide a large supply from his garden and potato-ground, and so to use them that, when they are sound, and will keep, they may supply the wants of his family through the whole winter. It is too frequently the case, that they are eaten in an extravagant manner, when they are new, and the crop newly gathered, and the whole stock is consumed before Christmas. It is also very desirable, that the labourer should grow a further quantity, with which he may feed a pig, since in the crop for his own use there will be refuse potatoes which could only be eaten by a pig; and these, with the potato-peels and other refuse food of the family, would almost keep a young pig. Half an acre of potato ground will yield 160 bushels of potatoes, and 50 bushels of them will keep a pig for 40 weeks, and with 16 stones of meal, will produce a pig worth £5 or £6 or more. Half of this pig would supply 2 lbs. of meat or bacon to his family weekly, and do much towards supplying all his wants in meat.

Green vegetables are often eaten in great excess, when they are abundant, and the supply is soon exhausted. It is better to eat them moderately over a longer period. When bacon is boiled with cabbage, the water should not be thrown away until the fat has been skimmed from it. The labourer should seek to provide winter greens and early cabbages, and besides a good supply of

cabbage there should be onions, carrots, parsnips, and rhubarb.

Cow's cheek and sheep's head are the cheapest joints of meat, and they should be boiled and the liquor used as broth. The meat of the former will supply a small portion of meat for many days; and the broth and the fat (which may be properly skimmed off) will nourish the children and save the expense of butter.

In buying meat, the small pieces which are without bone and are cut off the joints, should be chosen. Next follow the joints of meat, which are without bone, as the thick flank and part of the round; next the thick and solid parts of the animal, in which the flesh is considerable in proportion to the bone, as the legs of pork and mutton, and the loin and chine of beef, except in fashionable neighbourhoods, where they are sold at a high price; and lastly, such joints as the neck of mutton, and lamb, and the breast of veal.

Pickled pork, which is used almost to the exclusion of bacon and butcher's meat in many counties, is a cheap food, and is highly savoury, and in no instance have I heard of ill effects attributed either to the salting or the pork.

The cheap cheese used in Devonshire and South Wales is very economical food, if eaten when it is six months old and in small quantities; but cheese at more than sixpence per pound is not economical. It is, however, a convenient food, and helps to make a meal, when meat is not accessible, and when cooking is not convenient.

Tea and coffee should be drunk weak, but not in too great quantities; and when milk can be obtained, it should always be preferred. It should be understood, that when weak, these beverages have little, if any, action other than that due to the warm water, and the

chief use of them is to provide a supply of an agreeable and warm fluid, and hence at the price paid for them they are really very dear foods. They should never be given to children if warm milk can be obtained.

Beer and cider should never be purchased by the poor man, and if he can induce his employer to give him the value of these allowances in money he will do well to do so—at least for half the quantity, which is allowed him. When they are received as part of the wages, the husband should always take a portion home to his wife, and since two pints of cider is the least quantity, which is allowed daily, he may do so without injury to himself.

A most desirable point in connection with the dietary² of the poor man, is that he should take all his earnings home to his wife, learn the utter valuelessness of strong drinks, and not spend any portion of his money at the public-house; and another not less so is, that the wife should have the means, the disposition, and the ability, to make her home happy and cheerful, by a supply of good, warm, and well-served food to keep her husband at home.

"Practical Dietary," by DR EDWARD SMITH.

1. CONSISTENCE, thickness, degree of density. (Lat, *consisto*, to stand together.)

2. DIETARY, a course of diet, or mode of living with special reference to food.

MODEL DIETARY.

THE model dietary for a poor labouring man and his family is milk with plenty of bread or hasty pudding for breakfast and supper, and meat or bacon, with plenty of

vegetables, to be accompanied by broth or milk pudding, or bread and cheese for dinner. The milk may be new or skimmed; and skimmed milk is made nearly equal to new milk, if it be not sour, by adding about half an ounce of suet to each pint when it is made into puddings, and a little more than a quarter of an ounce of butter or suet when made into porridge. In the absence of both of these, butter-milk should be used largely, and should be drunk instead of water whenever it can be obtained.

The allowance to a Scotch labourer on a farm is $3\frac{1}{2}$ English pints of milk, and in Ireland 3 pints of skimmed milk or butter-milk daily. An English labourer should have 3 pints per day, and his wife and children somewhat less in proportion, if attainable. The poor in this country do not properly estimate the value of skim-milk, butter-milk, and whey. Tea should be reserved for the wife at the afternoon meal, and for the family on Sundays or on very special occasions. Eggs should be added to the dietary as often as possible.

In towns where milk is dear, its place may be supplied in part by cheap eggs. The model dietary there will be coffee, with as much milk as can be obtained, eggs and bacon with plenty of bread, or bread and butter, or hasty pudding with treacle or butter. Dinner as above. Tea: weak tea, with milk and bread and butter. Supper: bread and butter or bread and cheese, with an egg, or a milk and farinaceous¹ pudding, or hasty pudding with treacle or butter.

"Practical Dietary," by DR E. SMITH.

1. FARINACEOUS, consisting of, or containing, meal or flour of any kind. (Lat. *farina*, ground corn, flour.)

HINTS TO BATHERS.

Avoid bathing within *two* hours after a meal.

Avoid bathing, when exhausted by fatigue or from any other cause.

Avoid bathing, when the body is cooling after perspiration.

Avoid bathing, altogether in the open air, if, after having been a short time in the water, there is a sense of chilliness with numbness of the hands and feet: but bathe when the body is warm, and lose no time in getting into the water.

Avoid chilling the body by sitting or standing UN-DRESSED, on the bank or in a boat, after having been in the water.

Avoid remaining too long in the water; leave it immediately there is the slightest feeling of chilliness.

The vigorous and strong may bathe early in the morning on an empty stomach.

The young and those who are weak, had better bathe two or three hours after a meal; the best time is, from two to three hours after breakfast.

Those who are subject to attacks of giddiness or faintness, and those who suffer from palpitation and other sense of discomfort at the heart, should not bathe without first consulting a doctor.

Directions of the London Royal Humane Society.

APPENDIX.



LIST OF ROOTS, CHIEFLY LATIN, FOR HOME LESSONS, AND SPELLING.

ADAPTED FROM BROMBY'S GRAMMAR.

The words in parentheses () are the participles of the corresponding Verb, or the possessives of the Noun. The letters F and G denote French and Greek.

- ACID-US, sour ; acid, acidity, acidulate.
AER (G.), the air ; aerial, aerolite, aeronaut, aeriform.
AGER (AGRI), a field ; agriculture, agriculturist.
AGGEL-OS (G. pronounced Angel-os), a messenger ; angel,
AL-O, I nourish ; aliment, alimentary. [evangelist.
ALTER, another ; alter, alteration, unalterable.
ALTERN-US, by turns ; alternate, alternately.
ALT-US, high ; altitude, exalt, exaltation.
AMIC-US, a friend ; amity, amicable, inimical.
AM-O, I love ; amiable, amiably.
AMPL-US, large ; ample, amplify, amplification.
ANGUL-US, a corner ; angle, angular, triangle, rectangle.
ANIM-US, the mind ; animate, unanimous, magnanimous.
ANN-US, a year ; annual, annuity, perennial,
ANTHROP-OS (G.), a man ; philanthropy, misanthropy.
ANTIQU-US, old ; antique, antiquity, antiquary, ancient.
APERI-O, I open ; aperture, aperient.
APT-US, suitable ; apt, adapt, aptly, aptitude, inapt.
AQU-A, water ; aquarium, aquatic, aqueduct, viaduct.
ARBIT-ER, a judge ; arbitrary, arbitrate, arbitrator.
ARCH-E (G.), government ; heptarchy, anarchy, patriarch.

- ARDE-O**, I burn ; ardent, ardour, arson.
ARM-A, arms ; armour, armory, army.
ARITHM-OS (G.), number ; arithmetic, arithmetician.
ARS (ARTS), art ; artist, artless, artisan, artificial, inert.
ART-US, a joint ; article, articulate, inarticulate.
ASTRON, a star ; astronomy, astronomer.
ASPER, rough ; asperity, exasperate, exasperation.
ATM-OS (G.), vapour, air ; atmosphere, atmospheric.
ATROX, cruel ; atrocious, atrocity.
AUDAX, bold ; audacious, audacity.
AUG-EO (AUCT-US), I increase ; augment, auction.
BAPTIZ-O (G.), I dip, sprinkle ; baptize, baptism.
BAS-IS (G.), base ; basely, debase, debasement.
BAR-OS (G.), weight ; barometer, barometrical.
BEAT-US, blessed ; beatitude, beatify, beatific.
BELL-UM, war ; rebel, rebellion, rebellious, belligerent.
BENE, well ; benevolent, benefactor, benediction.
BIBL-OS (G.), a book ; The Bible, Biblical.
BIB-O, I drink ; imbibe, winebibber, bibulous.
BI-OS (G.), life ; biography, biology, amphibious.
BIS, twice, or two ; bisect, biscuit, bisection, biped.
BON-US, good ; bounty, bountiful, bounteous.
BREV-IS, short ; brevity, brief, abbreviate.
CAPUT (CAPIT-IS), the head ; capital, captain, decapitate.
CALCUL-US, a small pebble ; calculate, calculation.
CALYPT-O (G.), I veil or cover ; apocalypse.
CAN-O, and **CANT-O**, I sing ; precentor, canticles, chant.
CAR-O (CARNIS), flesh ; incarnate, carnal, carnival.
CAV-US, hollow ; cave, excavate, cavern, excavation.
CAUS-A, a cause ; accuse, accusation, excuse, excusable.
CENT-UM, a hundred ; century, centurion, centage, per cent.
CERT-US, sure ; certain, ascertain, certify, certificate.
CHRIST-OS (G.), anointed ; Christ, Christian, Christendom.
CHRON-OS (G.), time ; chronology, chronicle.
CIRCUL-US, a circle or ring ; encircle, circulate, circular.
CIV-IS, a citizen ; civil, civility, civilian, civilise, uncivil.
CLIV-US, a slope ; declivity, acclivity, proclivity.
CÆLEST-IS, heavenly ; celestial, celestially.

- COR (CORDIS), the heart ; concord, accord, discord.
 CORP-US, a body ; corporal, corporate, corporation.
 CRESC-O, I grow ; crescent, increase, decrease.
 CRIMEN, a crime ; criminal, criminate, recrimination.
 CRUX (CRUC-IS), a cross ; crusade, crucify, crosier.
 CUB-O, or CUMB-O ; incumbent, recumbent, succumb.
 CULP-A, a fault ; culpable, exculpate, exculpation.
 CUR-A, care ; curate, accurate, secure, security.
 DEC-US, grace ; decorum, decorous, decorate, decoration.
 DENS (DENTIS), a tooth ; dentist, indenture, indented.
 DENS-US, thick ; dense, density, condense, condenser.
 DE-US, God ; Deity, deist, deify, deification.
 DEXTER, right-handed, clever ; dexterity, dexterous.
 DI-ES, a day ; dial, diary, meridian, diurnal.
 DIGN-US, worthy ; dignify, dignity, indignity, dignitary.
 DOL-EO, I grieve ; condole, doleful, dolorous.
 DOM-US, a house ; domestic, domicile, domesticated.
 DRUS (G.), an oak ; druid, druidism.
 DUR-US, hard, lasting ; durable, endure, duration, during.
 ED-ES, a house ; edify, edifice.
 EQU-US, equal ; equivalent, adequate, equator, equation.
 ESTIM-O, I value ; esteem, estimate, estimable, estimation.
 EU (G.), well ; euphony, euphonious, evangelist, eulogise.
 EXPERIOR (EXPERT-US), I try ; expert, experiment, ex-
 EXTRA, beyond ; extraordinary, extravagant. [perience.
 FACIL-IS, easy ; facilitate, difficult, difficulty.
 FAM-A, fame ; famous, infamy, defame, defamation.
 FAMILI-A, a family ; familiar, family, familiarity.
 FATEOR (fess-us), I own ; confess, profess, professor, profes-
 FAV-EO, I favour ; favourite, favourable, disfavour. [sion.
 FELIX, happy ; felicity, felicitous, felicitation.
 FEMIN-A, a female ; feminine, effeminate, effeminacy.
 FEROS, cruel ; ferocious, ferocity, fierce.
 FID-ES, faith ; fidelity, infidel, infidelity, confide, con-
 FIGUR-A, a form ; transfigure, disfigure. [fidence.
 FIN-IS, an end ; finite, infinite, definite, definition.
 FING-O (FICT-US), I counterfeit ; feign, fiction, fictitious.
 FIRM-US, strong ; confirm, infirm, affirm, confirmation.

- FIX-US, fixed ; affix, prefix, postfix, suffix.
 FLAGR-O, I burn ; flagrant, conflagration.
 FLAMM-A, a flame ; inflame, flambeau, inflammable.
 FLECT-O (FLECT-US), I bend ; reflect, inflection, deflect.
 FLU-O, I flow ; fluid, confluence, influence, superfluous.
 FŒD-US, a covenant ; confederate, confederation, federal.
 FOLI-UM, a leaf ; folio, foliage, port-folio.
 FORM-A, a shape ; conform, deform, reform, reformation.
 FOR-O, I bore ; perforate, perforator, perforation.
 FORS (FORT-IS), luck ; fortune, misfortune, fortuitous.
 FORT-IS, strong or brave ; fortify, fortitude, fort, forte.
 FRATER, a brother ; fraternal, fraternity, fraternise.
 FRU-OR (FRUCT-US), I enjoy ; fruit, fruitless, fruition.
 FRUSTRA, in vain ; frustrate, frustration.
 FUGI-O, I flee ; fugitive, refuge, refugee.
 FUM-US, smoke ; fume, fumigate, perfume, perfumery.
 FUNDUS, the bottom ; foundation, fundamental.
 GE (G.), the earth ; George, geography, geology.
 GEN-US (GENER-IS), a race ; general, degenerate, re-
 generate.
 GER-O (GEST-US), I bear ; suggestive, digest, vicegerent.
 GLOB-US, a round body ; globe, globule, globular.
 GLORI-A, glory ; glory, glorious, glorify.
 GONI-A (G.), an angle ; octagon, trigonometry, diagonal.
 GRADI-OR (GRESS-US), I step ; degrade, transgress.
 GRAND-IS, great ; grandeur, grandfather, aggrandise.
 GRAPH-O (G.), I write ; biography, geography, telegraph.
 GRAT-US, thankful ; gratitude, grateful, ingrate.
 GRAV-IS, heavy ; gravity, gravitation, aggravate.
 GREX (GREG-IS), a flock ; congregate, aggregate.
 GUBERN-O, I rule ; govern, government, governor.
 GUST-O, I taste ; gusto, disgust.
 HÆR-EO (HÆS-US), I stick ; adhere, adhesion, adhesive.
 HÆR-ES, an heir ; hereditary, inheritor, inheritance.
 HAL-O, I breathe ; exhale, inhale, exhalation.
 HAURIO (HAUST-US), I draw ; exhaust, inexhaustible, ex-
 haustion.
 HEMI, half ; hemisphere, hemistich, hemispherical.

- HEPTA (G.), seven ; heptarchy, heptagon.
 HIER-OS (G.), holy ; hierarchy, hieroglyphics.
 HILAR-IS, cheerful ; exhilarate, hilarity, hilarious.
 HOL-OS (G.), the whole ; catholic, holocaust.
 HOM-O, a man ; homicide, human, humane.
 HOR-OS (G.), a boundary ; horizon, horizontal.
 HORT-OR, I exhort ; hortatory, exhort, exhortation.
 HORT-US, a garden ; horticulture, horticulturist.
 HOSP-ES, a guest ; hospitable, hospital, hospitality.
 HOST-IS, an enemy ; host, hostile, hostility.
 HUM-EO, to be moist ; humidity, humid, humour.
 HUM-US, the ground ; humble, humiliate, exhume, post-
 IGN-IS, fire ; igneous, ignite, ignition. [humous.
 IMIT-OR, I copy ; imitate, inimitable, imitation, imitative.
 IMPER-O, I command ; imperative, imperial, imperious,
 emperor.
 INSUL-A, an island ; insular, insulate, insulation, peninsular.
 INTEGER, entire ; integrity, integral.
 INTESTIN-A, the bowels ; intestine, intestinal.
 INVIT-O, I bid ; invite, invitation.
 IR-A, anger ; ire, ireful, irascible, irritate, irritation.
 ITER (ITINER-IS), a journey ; itinerate, itinerant.
 INCEND-O, I burn ; incense, incensed, incentive.
 JACIO (JACT-US), I throw ; adjective, reject, interjection,
 subject, inject, project.
 JOUR (F.), a day ; journal, journey, journeyman.
 JUDIC-O, I judge ; judicious, judicial, prejudice.
 JUR-O, I swear ; jury, juror, abjure, adjure, perjure, per-
 JUS (JUR-IS), justice ; injure, jurisdiction. [jury.
 JUST-US, just ; justify, adjust, justice.
 JUVEN-IS, a youth ; juvenile.
 JUV-O, I help ; adjutant, coadjutor.
 LAB-EIN (G.), to take ; syllable, monosyllable.
 LAB-OR (LAPSUS), I glide ; lapse, elapse, collapse.
 LAMENT-OR, I bewail ; lament, lamentation.
 LAT-US, carried ; translate, relate, superlative.
 LAT-US (LATERIS), the side ; lateral, equilateral.
 LAT-US, broad ; latitude.
 LEG-O (LECT-US), I gather ; collect, recollect, elect.

- LEV-O**, I lift ; lever, elevate, elevation.
LEX (**LEGIS**), a law ; legal, legislator, legitimate.
LIBER, a book ; library, librarian.
LIBER, free ; liberty, liberal, deliver, liberation.
LICET, it is lawful ; license, licentiate, illicit.
LIG-O, I bind ; ligament, oblige, religion, religious.
LINGU-A, the tongue ; linguist, lingual, language.
LIQU-EO, I melt ; liquid, liquor, liquefy, liquefaction.
LITER-A, a letter ; literal, literature, obliterate.
LOC-US, a place ; local, locality, locomotive, dislocate, allocate.
LOG-OS (**G.**), a word or discourse ; theology, chronology.
LONG-US, long ; longitude, longevity, prolong.
LOQU-OR (**LOCUTUS**), I speak ; elocution, colloquy.
LUX (**LUC-IS**), light ; lucid, lucidity, lucifer, elucidate.
LUD-O (**LUSUS**), I play ; prelude, delude, collusion.
LUMEN (**LUMIN-IS**), light ; illuminate, luminary.
LUSTR-O, I shine ; lustration, illustrate, illustrious.
MAGNUS, great ; magnify, magnanimous, magnanimity.
MAL-US, evil or ill ; malefactor, malevolent, malevolence.
MALLE-US, hammer ; malleable, mallet.
MAN-EO, I stay ; mansion, permanent, remain, permanence.
MAN-US, the hand ; manufacture, manuscript, manacle.
MARE, the sea ; marine, mariner, maritime.
MARG-O, brink ; margin, marginal.
MATERI-A, matter ; material, materialist.
MATER, a mother ; maternal, matron, matriculate, matriculation.
MATUR-US, ripe ; maturity, immature, premature.
MEDI-US, the middle ; Mediator, intermediate, medium.
MEL-OS, a song ; melody, melodious, philomel.
MEMOR, mindful ; memorable, memorandum, memorial.
MENS, the mind ; mental, mentally.
MENSUR-A, a measure ; mensuration, immensity.
MERC-OR, I buy ; merchant, commerce, mercantile.
MERGO, I plunge ; emerge, submerge, immerse, immersion.
METRON (**G.**), a measure ; meter, diameter, geometry.
MIGR-O, I remove ; migrate, emigrate, emigrant, immigrant.
MIN-EO, I hang over ; eminence, prominence, prominent.

MINISTER, a servant ; ministerial, administer, administration.
 MISC-EO (MIXT-US), I mingle ; miscellaneous, mixture.
 MISER, wretched ; misery, miserable, commiserate.
 MITIG-O, I make soft ; mitigate, mitigation.
 MOD-US, a manner ; mood, model, modify, modulate.
 MOLI-OR, I build ; demolish, demolition.
 MON-EO (MONIT-US), I warn ; monitor, admonition.
 MONS, a mountain ; promontory, mountaineer, surmount.
 MONST-RO, I show ; demonstrate, remonstrate, remonstrance.
 MORD-EO (MORS-US), I bite ; morsel, remorse, remorseful.
 MORS (MORT-IS), death ; mortal, mortify, immortal.
 MOV-EO (MOT-US), I move ; moveable, promote, emotion.
 MOS (MORIS), a manner ; moral, immoral, morality.
 MULT-US, many ; multiply, multitude, multiplication.
 MUT-O, I change ; mutable, commute, transmute.
 MUN-US, a gift ; munificent, remunerate, remuneration.
 NAVIS, a ship ; navy, navigate, circumnavigate.
 NECT-O (NEX-US), I tie ; connect, connection, annex.
 NEG-O, I deny ; negative, negation.
 NEUTER, neither ; neuter, neutral, neutrality.
 NOC-EO, I hurt ; innocent, innocence, noxious, innocuous.
 NIHIL, nothing ; annihilate, annihilation.
 NOMEN, a name ; noun, nominative, nominate, denominator.
 NOM-OS (G.), a law ; Deuteronomy, astronomy.
 NORM-A, a rule ; normal, abnormal, enormous.
 NOV-US, new ; novel, novelty, novice, innovate, renovate.
 NOX (NOCT-IS), night ; equinox, nocturnal.
 NUMER-US, a number ; numerous, numerical, numeration.
 NUNCI-O, I tell ; announce, denounce, pronounce, enunciate.
 NUTRI-O, I nourish ; nutriment, nutritive, nutrition, nurse.
 OCT-O (G.), eight ; octagon, octave, octangular, October.
 OCUL-US, the eye ; ocular, oculist, inoculate.
 OD-OS (G.), a way ; Exodus, period, method.
 ODOR, smell ; odoriferous, odorous.
 OL-EO, I smell ; redolent.
 OMN-IS, all ; Omnipotent, omnivorous, omniscience.
 OPAC-US, dark ; opaque, opacity.
 OPER-A, work ; operate, operative, operation, co-operate.
 OPIN-OR, I think ; opinion, opined.

- OPT-o, I wish ; option, optional, adopt.
 OPSOMAI (G.), I see ; optics, optical, optician.
 ORB-IS, a globe ; orb, orbit, exorbitant, exorbitancy.
 ORDO, order or law ; ordain, extraordinary, disorder.
 ORIGO, the beginning ; origin, original, originality.
 ORI-OR, I rise ; orient, oriental, orientalist.
 ORN-o, I adorn ; ornament, ornamental.
 OR-o, I beg ; adore, adorable, inexorable.
 ORTH-os (G.), correct ; orthography, orthodox.
 PAND-o, I spread ; expand, compass, expanse, expansion.
 PAN-is, bread ; companion, company, companionable.
 PAR, equal ; par, parity, compare, comparison.
 PAR-EO, I appear ; apparent, transparent, disappearance.
 PARL-E (F.), I speak ; parliament, parlour, parley.
 PARS, a part ; party, partial, impartial, partake.
 PATER, a father ; paternal, patriarch, patron, patronise.
 PASC-o (PAST-US), I feed ; pastor, pasture, pastoral.
 PATH-os (G.), feeling ; sympathy, pathetic, antipathy.
 PAX (PAU-IS), peace ; pacify, appease, pacific.
 PENE, almost ; peninsula, peninsular, penult.
 PENETR-o, I pierce ; penetrable, penetrate, penetration.
 PENTE (G.), five ; pentagon, Pentateuch, pentecost.
 PERPETUUS, never ceasing ; perpetual, perpetuate.
 PES (PED-IS), the foot ; quadruped, impede, pedestrian.
 PEST-IS, a plague ; pestilence, pester, pestiferous.
 PET-o, I seek or desire ; petition, competitor.
 PHEMI (G.), I speak ; blaspheme, blasphemous.
 PHAIN-o (G.), I show ; fancy, epiphany, sycophant.
 PHER-o (G.), I bear ; periphery, metaphor, phosphoric.
 PHONE (G.), a sound ; phonic, euphony, symphony.
 PHYS-IS (G.), nature ; physical, physics, physiology.
 PING-o (PICT-US), I paint ; Picts, depict, pictorial.
 PI-US, pious ; piety, impiety, impious.
 PLACE-o, I please ; placid, placidity, complacent.
 PLANT-A, the sole of the foot, a plant ; implant, transplant.
 PLAN-US, plain ; explain, explanatory, explanation.
 PLAUD-o, I praise, I clap with my hands ; applaud, plaudit.
 PLEN-US, full ; plenty, replenish, plentitude.
 PLE-o, I fill ; complete, completion, replete.

PLIC-O, I fold ; complicate, multiply, implicate.
 PLORE-O, I wail ; deplore, implore, deplorable.
 PLUM-A, a feather ; plumage, plume, deplume.
 PLUS (PLURIS), more ; plural, surplus, plurality.
 PŒNIT-EO, I repent ; penitent, penitence, penitential.
 POLIS (G.), a city ; polite, politics, metropolis.
 POLYS (G.), many ; polysyllable, polyglot, polygon.
 PONDUS (PONDER-IS), weight ; ponderous, preponderate.
 POPUL-US, the people ; population, popular, publish.
 POSSE, to be able ; possible, impossibility.
 POTENS, powerful ; omnipotent, potentate, potential.
 POSTUL-O, I desire ; expostulate, postulate.
 PRACT-OS (G.), done ; practicable, practice, practical, practitioner.
 PRAV-US, wicked ; deprave, depravity.
 PRÆD-A, plunder ; predatory, depredation.
 PREC-OR, I pray ; deprecate, imprecate, imprecation.
 PREHEND-O, I take ; apprehend, comprehension.
 PRETI-UM, a price ; appreciate, appreciation, depreciate.
 PRIM-US, first ; prime, primate, primeval, primitive.
 PROB-O, I try ; probe, probation, approve, prove, improve.
 PROSPER, successful ; prosperous, prosperity.
 PROXIM-US, nearest ; approximate, proximity.
 PUD-EO, I am ashamed ; impudent, impudence, repudiate.
 PUGN-A, a fight ; repugnant, pugnacious, repugnance.
 PULV-IS (PULVERIS), dust ; pulverize, pulverization.
 PUN-GO (PUNCT-US), I point ; punctuate, compunction.
 PUN-IO, I punish ; impunity.
 PUR-US, pure ; purify, impurity, purification.
 PUT-O, I prune, I think ; amputate, compute, dispute.
 QUADR-A, a square, four ; quadrangle, quadrant, quadruped.
 QUÆR-O (QUÆSIT-US), I ask ; query, question, acquisition.
 QUALIS, of what kind or sort ; quality, qualify.
 QUAT-IO (CUSS-US), I shake ; quash, concussion, percussion.
 QUIES (QUIET-IS), rest ; quiet, disquiet, inquietude.
 RADI-US, a ray ; radiant, radiance, irradiate.
 RADIX, a root ; radical, radish, eradicate.
 RAD-O (RAS-US), I scrape ; abrade, erase, erasure, razor.
 RANG (F.), a row ; arrange, derange, disarrange.
 RAPIO, I snatch ; rapine, rapture, rapacious, rapacity.

- RAR-US**, thin ; rare, rarify, rarely, rarity.
REGUL-A, a rule ; regular, regulation, regulator.
RIDE-O (**RIS-US**), I laugh ; deride, ridicule, risible.
RIG-O, I water ; irrigate, irrigation.
ROBOR, the oak, strength ; robust, corroborate.
RODO, I gnaw ; rodent, corrode, corrosion.
ROG-O, I ask ; rogation, interrogate, interrogation.
RUMP-O (**RUPT-US**), I break ; eruption, interrupt, interrup-
RUS (**RUR-IS**), the country ; rustic, rusticity, rural. [tion.
SACER, holy ; consecrate, sacrifice, desecrate, desecration.
SAGAX, wise ; sagacious, sagacity, sage, presage.
SAL, salt ; saline, salad, salary, salaried.
SAL-IO, I leap ; salient, insult, consult, assail, assault.
SANCT-US, holy ; saint, sanctify, sanctification, sanctuary.
SANGUIS, blood ; sanguinary, cousin, consanguinity.
SANUS, sound ; sane, insane, insanity, sanitary.
SATIS, enough ; satisfy, satisfaction, satiate, satiety.
SCAND-O, I climb ; ascend, descend, condescend, ascension.
SCEPTOMAI (**G.**), I look round ; sceptic, scepticism, sceptical.
SCHISM-A (**G.**), division ; schism, schismatical.
SCOPE-O (**G.**), I see ; telescope, microscope.
SEC-O (**SECT-US**), I cut ; sect, section, bisect, dissect, intersect.
SEMEN, seed ; seminary, disseminate.
SEMI, half ; semitone, semicircle, semibreve.
SEQU-OR, I follow ; consequence, prosecute, subsequent.
SERVI-O, I serve ; servant, subservient, deserve.
SERV-O, I keep ; conserve, observe, reserve, preserve.
SIGN-UM, a sign ; assign, resign, signify, designate.
SIMILIS, like ; similar, similitude, fac-simile.
SIST-O, I stop ; desist, assist, resist, insist.
SIT-US, placed ; situate, situation, site.
SOCI-US, a companion ; social, associate, society, association.
SOL, the sun ; solar, solstice, parasol, solstitial.
SOLICIT-US, careful ; solicit, solicitor, solicitude, solicitous.
SOL-OR, I comfort ; solace, console, disconsolate.
SOL-US, alone ; sole, solitary, desolate, soliloquy.
SON-US, sound ; consonant, sonorous, dissonant, resound.
SORB-EO, I drink ; absorb, absorbent, absorption.
SPARG-O (**SPARSUS**), I spread ; disperse, intersperse.

- SPECIO (SPECT-US), I see ; spectacle, inspect, inspection.
 SPER-O, I hope ; despair, desperate, desperation, desperado.
 SPHER-OS (G.), a globe ; sphere, spherical, hemisphere.
 SPLEND-EO, I shine ; splendid, splendour, resplendent.
 SPOND-EO, I promise ; sponsor, correspond, responsible.
 STILL-O, I drop ; still, distillery, distill, instill.
 STRING-O (STRICT-US), I bind ; string, constrain, stricture.
 SUAD-EO, I advise ; persuade, persuasion, persuasive.
 SUMM-US, the highest ; summit, consummate, consummation.
 SUM-O (SUMPT-US), I take ; assume, resume, consume, presume.
 SURG-O (SURRECT-US), I rise ; surge, insurrection, resurrection.
 TANG-O (TACT-US), I touch ; contact, contagion, contagious.
 TARD-US, slow ; tardy, tardily, retard.
 TELE (G.), distant ; telescope, telescopic, telegraph, telegram.
 TEMN-O, I despise ; contemn, contempt, contemptible.
 TEMP-US, time ; temporal, contemporaneous, contemporary.
 TENTO (TEMPT-US), I try ; tempt, temptation, attempt.
 TERR-A, the earth ; terrace, terraqueous, Mediterranean, interment, terra firma.
 TERR-EO, I frighten ; terrify, terrible, deter, terrific.
 TEST-IS, a witness ; testify, attest, testimony, test.
 THE-OS (G.), GOD ; Theology, Theophilus, atheist.
 TIM-EO, I fear ; timid, timidity, timorous, intimidate.
 TOLER-O, I bear ; tolerate, tolerable, toleration, intolerant.
 TON-OS (G.), a tone ; monotone, monotony, semitone, tonic.
 TOP-OS (G.), a place ; topography, topographer, topic.
 TORQU-EO (TORT-US), I twist ; extort, extortion, distort.
 TORR-EO, I burn ; torrid, torrent (which seems to BOIL).
 TOT-US, whole ; total, totally.
 TRAD-O, I hand down ; tradition, traditional.
 TREM-O, I shake ; tremble, tremor, tremendous, tremulous.
 TREPID-US, fearful ; intrepid, trepidation.
 TRES, TRIA (G.), three ; treble, tripod, triangle.
 TRIBU-O, I give ; tribute, contribute, contribution.
 TRICÆ, hindrances ; extricate, intricate, intricacy.
 TROUV-E (F.), I find ; contrive, retrieve, retriever.
 TRUD-O, I thrust ; intrude, obtrude, intrusion, protrude.
 TUM-EO, I swell ; tumour, tumult, tumultuous.

- TURB-A**, a crowd ; turbulent, disturb, disturbance.
TYP-US (G.), a type ; prototype, antitype, typical.
UMBR-A, a shadow ; umbrella, adumbrate.
UN-US, one ; unit, uniform, unite, unity.
URBS, a city ; urbane, urbanity, suburbs, suburban.
UR-O (UST-US), I burn ; combustion.
UT-OR (US-US), I use ; abuse, peruse, disuse.
VACC-A, a cow ; vaccinate, vaccination.
VAC-ARE, to be empty ; vacation, evacuate, evacuation.
VAD-O (VAS-US), I go ; pervade, invasion, evasive.
VAG-US, a wanderer ; vague, extravagant, vagabond.
VAPOR, fume ; vapour, evaporate, evaporation.
VAST-O, I lay waste ; waste, devastate, devastation.
VEH-O, I carry ; vehicle, convey, inveigh.
VEL-O, I hide ; veil, reveal, develope.
VEND-O, I sell ; vend, vendor, venal.
VENER-OR, I reverence ; venerate, veneration, venerable.
VERB-UM, a word ; verb, verbal, adverb, verbose.
VERE-OR, I fear ; revere, reverence, irreverent.
VERG-O, I incline towards ; verge, diverge, divergence.
VER-US, true ; verify, verily, veracity, veracious, verity.
VESTIGI-UM, a foot mark ; vestige, investigate, investigation.
VEST-IS, a garment ; vest, vestment, invest, vestry, divest.
VI-A, a way ; devious, deviate, obvious, obviate, previous.
VID-UO, I part, I deprive of ; widow, widower.
VIGIL, watchful ; vigilant, vigilance.
VINDEX, a punisher of wrongs ; vindicate, vindication.
VIN-UM, wine ; vintage, vinegar, vineyard, vinery.
VIOL-O, I injure ; violate, violence, inviolate.
VIT-A, life ; vital, vitality, vitals.
VOL-O, I wish ; benevolent, benevolence, malevolent.
VOLV-O, I roll ; revolve, evolution, volume, volubility.
VOR-O, I devour ; carnivorous, voracity, voracious.
VOT-UM, a vow or a wish ; vote, votary, devote, devotee.
VULN-US, a wound ; vulnerable, invulnerable.

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